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THESIS

APPLICATION OF A UNIFORM PRICE QUALITY ADJUSTED DISCOUNT AUCTION FOR ASSIGNING VOLUNTARY SEPARATION PAY

by

Quincy R. Pearson

March 2011

Thesis Co-Advisors: Noah Myung
                                                          William Gates

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APPLICATION OF A UNIFORM PRICE QUALITY ADJUSTED DISCOUNT AUCTION FOR ASSIGNING VOLUNTARY SEPARATION PAY

Quincy R. Pearson
Captain, United States Marine Corps
B.S., University of Arizona, 2005

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March 2011**

Author: Quincy R. Pearson

Approved by: Noah Myung
                 Thesis Co-Advisor

                 William Gates
                 Thesis Co-Advisor

                 William Gates, Dean
                 Graduate School of Business and Public Policy

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LIST OF ACRONYMS AND ABBREVIATIONS

CFT   Combat Fitness Test

DLI   Defense Language Institute

DoD   Department of Defense

FMF   Fleet Marine Force

I MEF   Marine Expeditionary Force

IRB   Institutional Review Board

MCO   Marine Corps Order

MOS   Military Occupational Specialty

NPS   Naval Postgraduate School

OLS   Ordinary Least Squares

OSD   Office of the Secretary of Defense

PDR   Personal Discount Rate

PFT   Physical Fitness Test

PMOS   Primary Military Occupational Specialty

QUAD   Quality Adjusted Discount Auction

RV@PROC   Relative Value at Processing

SSB   Special Separation Benefit

TERA   Temporary Early Retirement Allowance

USMCMP   United States Marine Corps Manpower Planners

VSI   Voluntary Separation Incentive

YOS   Years of Service

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I.   INTRODUCTION

A.   BACKGROUND

At the end of the Cold War, the military services were asked to reduce troop levels, as the need for a large military force became unnecessary. During this time, military manpower planners faced the challenge of meeting targeted reduction goals while retaining quality personnel. To help the military services meet their reduction goals, Congress authorized the Department of Defense (DoD) to implement two monetary separation incentive programs: (a) the voluntary separation incentive (VSI) and (b) special separation benefit (SSB). Both programs fell under the 1992 and 1993 National Defense Authorization Act and targeted military personnel with 6 to 20 years of service (Congressional Budget Office [CBO], 1999). The intent of the programs was to increase the rate of voluntary separation among midcareer service members on active duty.

The military drawdown in Iraq and possible reductions in military spending may result in a force reduction. If Congress mandates a service-wide reduction of military manpower, planners may face a similar challenge in meeting reduction goals while retaining quality personnel. Uncertainty in today's civilian job market could potentially add to the challenges faced by manpower planners. Improvements in military compensation, job satisfaction, health benefits, and quality of life have induced more service members to remain on active duty rather than seek civilian employment at the end of service contracts. Since fewer personnel are likely to voluntarily separate, compared to those in the past, manpower planners need to evaluate and improve previous separation incentive policies.

During the drawdown of the early 1990s, the United States military services made significant reductions in their officer corps. Between 1989 and 1997, the Marine Corps reduced its officer corps by 11%, the Air Force by 29%, the Army by 26%, and the Navy by 22%. The services used reduction in accessions, normal attrition, involuntary separations under the up-or-out system, the voluntary separation incentive, the special

separation benefit, and the Temporary Early Retirement Authority (TERA) to accomplish their reduction goals (CBO, 1999). The effect of the voluntary separation incentive and special separation benefit programs on officers who chose the separation incentives is problematic, since a large number of officers who took advantage of the programs would have either separated voluntarily without the incentives or may have been involuntarily separated under the up-or-out system. Additionally, control measures were not implemented to ensure that the services were not separating quality officers. By using an auction mechanism as an alternative for offering separation amounts, the military services may: (a) achieve desired reduced force levels, (b) retain quality officers, and (c) increase their cost savings.

B.   PURPOSE

The objective of this thesis was twofold. The first research area was to determine the feasibility of the Marine Corps using a uniform price Quality Adjusted auction to assign voluntary separation bonuses and retain higher quality officers. The second research area concerned identifying the effects of personal, professional and economic factors on a Marine officer's decision to participate in a voluntary separation program.

C.   RESEARCH QUESTIONS

White (2010) examined the viability of using the quality adjusted discount (QUAD) auction to increase the retention rate of quality Marine aviators who receive aviation continuation pay. The study did not quantify the quality rating of the quality adjusted discount auction. This thesis attempts to quantify a quality rating for Marine Corps officers, which can later be applied to a quality adjusted discount auction. The primary research questions that will be addressed in the study are:

1.   Is there a correlation between a quality officer and the amount of compensation they are willing to accept for voluntary separation?

2.   Can a quality adjusted discount auction be used to effectively determine the appropriate separation pay to offer Marine officers who choose to participate in a voluntary separation program?

The secondary research questions that will be addressed in the study are:

1.   What factors make an impact on an officer's decision to participate in a voluntary separation program?

2.   How does a service member's discount rate effect his or her decision to stay in or leave the military?

D.   ORGANIZATION OF THE STUDY

The study is organized into eight chapters. Chapter II develops the background information on the voluntary separation incentive, special separation benefit, and Temporary Early Retirement Authority programs. This chapter includes a literature review of voluntary separation incentive, special separation benefit, and auction studies. Chapter III provides a review of auction theory and the application of auction mechanisms in the military labor market. Chapter IV explains the survey development process and implementation and provides a summary of the preliminary results. Chapter V describes the process used to develop the quality score rating for use in the quality adjusted discount auction simulations. The remainder of the study is broken down into two research areas. Chapter VI provides the methodology and results for the auction simulations, while Chapter VII provides the methodology and results for the multivariate analysis. Chapter VIII summarizes the findings and offers recommendations for future research.

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II.   MILITARY SPECIAL AND INCENTIVE (S&I) PAY

A.   CHAPTER OVERVIEW

This chapter reviews special and incentive pay and the policy tools used to assist the military services in meeting their force reduction goals. A description of special and incentive pay used to induce the voluntary separation of service members is the main focus of this chapter. The chapter concludes by identifying possible problems associated with previous special and incentive pay programs for separation and presents a literature review of prior studies.

B.   OVERVIEW OF MILITARY SPECIAL AND INCENTIVE PAY

Special and incentive pay for military service members is authorized under Chapter 5, Title 37 of the United States Military Code. Basic pay and pay increases do not sufficiently address all of the force management needs of the military services. Military services depend on special and incentive pay to address specific manning needs, such as: (a) retaining additional service members, (b) separating service members, and (c) attracting service members to understaffed positions or specialties (Coughlan & Gates, 2010).

Currently, none of the 60 plus special and incentive pays are applied to military separation. However, special and incentive pays in the form of voluntary separation incentive pay, were used in the past. Separation incentive programs used during the military drawdown of the 1990s were authorized under the National Defense Authorization Act for fiscal years 1992 and 1993. The programs included voluntary separation incentive (VSI), the special separation benefit (SSB) and the temporary early retirement authority (TERA). The programs were designed to encourage service members to leave the military voluntarily and provided manpower planners more flexibility in attaining their desired force structure goals.

1.   Eligibility Criteria for the VSI/SSB Program

While the eligibility criteria for the voluntary separation incentive and the special separation benefit program applied to all services, the military service secretaries had the authority to establish other requirements based on years of service, military occupational specialty (MOS), rank, and remaining time of obligated service (Noblit, 1993). The Department of Defense (DoD) established the following eligibility criteria for the VSI/SSB program:

1. The service member must have served on active duty for more than six years before 5 December 1992.

2. The service member must have completed his or her initial term of enlistment or obligation, including any extensions.

3. The service member must have served at least five years of continuous active duty immediately preceding the date of separation.

4. The service member must have served on active duty, upon separation, for less than 20 years and not be eligible for retired or retainer pay.

5. The service member must be a regular or a reservist on the active duty list.

2.   Voluntary Separation Incentive (VSI)

The voluntary separation incentive program offered eligible service members who chose voluntary separation from the military an annuity payment. The voluntary separation incentive annuity is an annual payment equal to the service member's years of service multiplied by 2.5% of the service member's basic pay (voluntary separation incentive annuity = 2.5% x final monthly basic pay x 12 months x years of service). The payment period equals twice the number of years served by the officer under the condition that the service member continues to serve in a reserve component for no less than 3 years. Service members who received voluntary separation incentive payments are not eligible to receive reserve pay (Viltz, 2004).

3. Special Separation Benefit (SSB)

As an alternative to the voluntary separation incentive, the special separation benefit   offered eligible service members who chose voluntary separation from the military a lump sum payment. The special separation benefit lump sum is a one-time payment equal to 15% of the service member's final monthly pay multiplied by the number of years served (special separation benefit lump sum = 15% x final monthly basic pay x 12 months x years of service). Similar to the voluntary separation incentive requirements service members who received the special separation benefit payment are required to serve in a reserve component for no less than 3 years following separation from active duty (Viltz, 2004).

4. Temporary Early Retirement Authority (TERA)

The temporary early retirement authority program offered service members the option of retiring after only 15 years of service. Service members had to have served at least 15 years but less than 20 years on active duty to be eligible for the program. Under the temporary early retirement authority, service members received similar retirement benefits offered to other retirees, but their actual payments were less.

The temporary early retirement authority allowed service members to gain points towards retirement by working in a civil service job between the time of early retirement and the date they would have retired at 20 years of service. A service member would receive 50% of his or her base pay at age 62 if he or she worked in an approved job (Reppert, 2004).

C. PROBLEMS

While the military services appeared to be successful in using the separation incentive pay to shape their forces and meet their manpower goals, it was burdened with two main problems. The military services could not distinguish between service members who needed the voluntary separation incentive and the special separation benefit programs to leave and those who would have left without utilizing the programs.

As a result, the services paid excess monies to service members who would have left the military without the separation incentive payment (Reppert, 2004). The excess payment is known as economic rent and is defined as an extra benefit received by personnel, as a result of a program (Reppert, 2004). A second problem involved the voluntary separation incentive, the special separation benefit, and a temporary early retirement authority program is that the programs did not place emphasis on retaining quality service members. The military services expected to separate low performing service members and retain quality performers. Since all service members who met the eligibility criteria for the separation programs were given the opportunity to participate, regardless of their level of performance, it is possible that quality performers were separated from the military.

D.   LITERATURE REVIEW

The behavior of military personnel in reacting to the voluntary separation incentive, the special separation benefit, and the use of auction mechanisms as an alternative to special and incentive pay and bonuses will be explored. The study will investigate studies on the voluntary separation incentive and special separation benefit that highlight two main weaknesses of the early separation incentive programs. The military services paid economic rents to some service members and separated quality performers. The study will explore present studies where the application of auction theory is used to promote reduced cost saving to the United States Department of Defense.

1.   VSI/SSB Studies

a.   Study by Beth J. Asch and John T. Warner (2001)

Asch and Warner's (2001) study evaluated the efficacy of the voluntary separation incentive and the special separation benefit programs. The authors explored whether or not the programs: (a) induced substantial separations over and above what would normally occur and (b) induced more low-quality personnel to leave than high-

quality. The authors compared Army enlisted personnel separations during calendar years 1989 and 1992. Individuals were tracked during the 12-month period to determine who stayed and who separated from the Army. The data used in their study came from the Defense Manpower Data Center (DMDC).

Asch and Warner (2001) hypothesized that low quality personnel would take the voluntary separation incentive and the special separation benefit offer more often than high-quality personnel. They defined a high-quality service member as an enlistee who has a high school diploma and placed in the top one-half of the armed forces qualification test (AFQT) score distribution. The results of their study found that while the voluntary separation incentive and the special separation benefit programs increased separations by 100% the Department of Defense paid economic rents to about one-half of the eligible personnel who left with the voluntary separation incentive and the special separation benefit. The Department of Defense paid the personnel to leave when they would have separated even without the program.

Asch and Warner (2001) found that the voluntary separation incentive and the special separation benefit program increased the probability of separation by 10 percentage points for high-quality personnel, which made up about 40% of the eligible population. Results of Asch and Warner's study provided evidence that the Army voluntarily separated high-quality personnel and paid economic rent to about one-half of their personnel who accepted the voluntary separation incentive and the special separation benefit offer.

b. *Study by Marvin M. Smith (1999)*

Smith's (1999) study used officer separation data from the United States Department of Defense to examine: (a) the different approaches the military services used in reducing their officer corps during the post Cold War drawdown and (b) the effects the drawdown had on the composition of the officer corps. When examining the effects of the drawdown on the officer corps, Smith found that the services protected officers who

were currently on active duty by significantly reducing officer accessions. The large cut in officer accessions led to an officer corps becoming more senior in years of service and rank (Smith, 1999).

The military services increased the rate of separation among officers who were on active duty by offering the voluntary separation incentive, the special separation benefit, and temporary early retirement authority programs. Smith (1999) suggested that although the voluntary separation incentive and the special separation benefit programs were successful in reducing the level of officer corps, more than 50% of the officers who accepted the programs may have separated without them. During the drawdown period, the average special separation benefit payment for a captain in the Army and Air Force were $58,200 and $50,900, respectively. Since one-half of the special separation benefit recipients would have separated without the offer, the Army and Air Force paid twice as much as they needed to voluntary separate captains (Smith, 1999). The payment of economic rent to those officers who would have voluntarily separated without the voluntary separation incentive and the special separation benefit was a significant cost to the Department of Defense.

c. Study by Mark L. Noblit (1993)

Noblit's study (1993) accessed data from the headquarters of the Marine Corps' enlisted master file to estimate and forecast enlisted Marine take-rates for the voluntary separation incentive and the special separation benefit programs. Noblit used logic regressions to predict the probability that a Marine takes the programs. The data accounted for enlisted Marines who participated in the programs before June 30, 1992.

Results of Noblit's study (1993) indicated that when compared to Marines with faster promotion rates "Marines who were promoted to their current pay grade at a slower than average rate for their particular military occupational specialty are less likely to take the voluntary separation incentive and the special separation benefit offer" (p. 62). Using the length of time for promotion as a measure of performance, where a slower

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promotion rate indicates a low performer, the author's study suggested that higher performers were more likely to accept the voluntary separation incentive and the special separation benefit.

d. Study by F. Rogge (1996)

Rogge (1996) used data from the defense manpower data center to estimate the true separation rates of naval officers during fiscal year 1993 and of Navy enlisted personnel during fiscal year 1992 using the annualized cost of leaving (ACOL) framework. The author used multivariate probity regressions with a binary dependent variable. The dependent variable was coded 1, if the individual stayed on active duty, and 0, if the individual separated with either the voluntary separation incentive or special separation benefit option.

The results of the officer model found that 68.9% of the officers who received the voluntary separation incentive and the special separation benefit payment would have separated from the military without the voluntary separation incentive, and the special separation benefit offer yielding a $33.24 million excessive payment to the officers. The remaining 31.1% of the officers were induced to leave due to a bonus. The enlisted model found that 96% of the enlisted personnel who received the voluntary separation incentive and the special separation benefit payment would have separated from the military without the offer, and 4% were induced to leave due to a bonus. Both models provide evidence that the Navy paid economic rents to service members who participated in the voluntary separation incentive and special separation benefit.

2. Auctions as an Alternative to S&I Pay and Bonuses

Studies revealed the use of auction mechanisms as an alternative to assigning special and incentive pay and bonus amounts from different approaches. The assignment incentive pay program uses a standard reverse auction method. The framework of a sequential self-selection auction mechanism predicts behavior based on opportunity cost. The quality adjusted discount auction theory utilizes the quality of personnel retained.

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a. Study by H. Golding, E. Christensen, and D. Lien (2002)

Golding, Christensen, and Lien (2002) evaluated the cost and benefits of the Navy's assignment incentive pay (AIP) program. The program uses an auction to encourage sailors to be voluntarily assigned to hard-to-fill billets. Under the auction eligible sailors submit $50 incremental bids, for a maximum of $2,500, to indicate his or her willingness to be assigned to a specific billet. The sailor who submits the lowest bid wins the auction and is assigned to the auctioned billet. When comparing the assignment incentive pay program to the previous methods of assigning sailors to hard-to-fill billets the authors found that "combining the retention costs and lower bound cost of sea duty credit, we estimate that the costs of the current assignment system and incentives exceed $116 million annually" (Golding, Christensen, & Lien, 2002, p. 3).

b. Study by P. Bock (2007)

Bock (2007) explored the cost savings for the Marine Corps by replacing its current selective reenlistment bonus (SRB) program with a sequential self-selection auction mechanism (S^3AM). The theoretical framework of the mechanism predicts a Marine's behavior based on opportunity cost. The author applied opportunity cost to a Marine's willingness to accept a long-term verses short-term reenlistment contract and hypothesized that: (a) a Marine with a low opportunity cost for active duty would accept a long-term contract with a lower bonus and (b) a Marine with a high opportunity cost for active duty would accept a short-term contract with a higher bonus.

Using data from the Marine Corps' zone A population from fiscal year 2006 for three military occupational specialties, as the sample for the sequential self-selection auction mechanism, Bock (2007) found that paying a Marine a monetary sum that is similar to his or her active duty opportunity cost reduced the payment of economic rent. The study showed that if a sequential self-selection auction mechanism was used instead of the current selective reenlistment bonus program, the Marine Corps could save approximately 3 million dollars when assigning selective reenlistment bonus amounts to Marines in those three military occupational specialties.

c. *Study by C. White (2010)*

White (2010) explored auction theory research for assigning special and incentive pay and bonuses by controlling the quality of personnel retained. He investigated a uniform price quality adjusted discount auction model to assign aviation continuation pay (ACP) to eligible Marine Corps aviators. The model controls for quality by assigning a quality rating. Each officer who met the predetermined quality rating was given a monetary sum in addition to the cut off amount established by the auction. White addressed two major problems with the current aviation continuation pay program. Both of the problems were prevalent when the voluntary separation incentive and the special separation benefit program were implemented. Assignment of aviation continuation pay does not account for the quality of aviators being retained. There was no consideration for the economic rent paid to aviators who would have remained on active duty for a lower aviation continuation pay bonus and those who would have remained without the aviation continuation pay bonus.

To illustrate the cost saving and benefits of using a uniform price quality adjusted discount auction model, White (2010) used the average long-term aviation continuation pay bonus for fiscal year 2009 as a baseline. He proposed a scenario where the Marine Corps set a goal of retaining 15 out of 25 officers for a specific military occupational specialty. In the scenario, he compared the cost to retain 15 aviators using the current aviation continuation pay 6 year contact with a standard uniform price auction and a uniform price quality adjusted discount auction.

The results showed that, compared to the current aviation continuation pay program, a uniform price auction reduced the cost to retain an additional aviator by $4,483. Considering the Marine Corps retained 330 aviators in fiscal year 2009 the total cost to retain them could have been reduced by 28%. When comparing the uniform price auction with a quality adjusted discount auction, the results showed that the quality adjusted discount auction reduced aviation continuation pay savings by $4,885 per aviator and increased the quality of the aviators being retained.

E.   CHAPTER SUMMARY

The military special and incentive pay gives the military services flexibility to manage and shape their force structure. During the drawdown of the early 1990s, special and incentive pay in the form of a voluntary separation incentive, the special separation benefit, and temporary early retirement authority programs were used by the services to attain desired force structure goals. Although the separation incentive programs appeared to be successful, the military services paid: (a) economic rent to participants who would have left the military without the separation incentive offer and (b) separated personnel who were quality performers.

A review of several studies provided evidence that the Department of Defense paid economic rents to service members who would have separated without the voluntary separation incentive and the special separation benefit offer resulting in voluntarily separated quality service members. Prior research has shown that auction mechanisms can be more cost effective when applied to the selective reenlistment bonus and other special and incentive pay programs. Applying similar auction mechanisms to separation incentives and bonuses could reduce the payment of excess economic rent to service members and prevent the separation of quality personnel.

III.   AUCTION THEORY

A.   CHAPTER OVERVIEW

This chapter draws from prior auction studies authored by Kyle P. Hahn, Pete Coughlan and Bill Gates, Christopher White and Brooke Zimmerman. The chapter serves two purposes. The first purpose of this chapter is to provide a basic understanding of auctions. The second purpose is to: 1) discuss the application of auctions in the military labor market and 2) show the cost savings that can be achieved using an auction for assigning voluntary separation bonuses.

B.   BACKGROUND

Dating back to 500 B.C., auctions have been used in the civilian market place as a mechanism to sell goods and services. Auctions are defined as "an economic mechanism whose purpose is the allocation of goods (or services) and the formation of prices for those goods (or services) via a process known as bidding" (Henderson, 2007, p. 21). Auctions in the civilian market place consist of a variety of transactions between two primary participants, the sellers and the buyers. The role of each participant is dependent on the type of transaction being conducted. For instance, when there is a single seller and multiple buyers the seller is the individual who has a good or service to be auctioned. The buyers are those individuals who compete by submitting bids for the right to purchase the good or service to be auctioned. The type of auction is known as a forward auction. When there is a single buyer and multiple sellers, the sellers are those individuals who compete by submitting bids for the right to sell their goods or services. The buyer is the individual who purchases by accepting bids for the goods or services from the sellers. The type of auction is known as a reverse auction.

C.   VALUE

An inherent characteristic to auctions is the value the buyer and seller places on the goods or services. A buyer's value is reflected in his or her reservation price. In a

forward auction a buying bidder's reservation price is the maximum amount or opportunity cost each bidder is willing to pay for the goods or services. In a reverse auction, the bidding sellers' reservation price is the minimum amount each bidder is willing to accept for their goods or services. A seller's value is reflected in his or her reserve price. In a forward auction, the seller's reserve price is the minimum amount the seller is willing to accept for goods or services. In a reverse auction, the reserve price is the maximum amount the buyer is willing to pay for goods or services.

D. BIDDING PROCESS

Another characteristic of auctions is the bidding process. The bidding process is the way in which buyers in a forward auction and sellers in a reverse auction submit their bids. There are generally two ways of submitting bids in an auction: (a) open bids and (b) sealed bids. In an open bid forward auction the buyer competes by publicly raising his or her bid until a winner is announced. The winner is the buyer who submits the highest bid. In an open bid reverse auction the seller competes by publicly lowering his or her bid until a winner is announced. The winner is the seller who submits the lowest bid.

Unlike the open bid auctions, bidding in a sealed bid auction is private and bidders are only allowed to submit one bid. Competing bidders are not able to observe other bids, and bidders cannot adjust their bids. Once the submitted bids are opened simultaneously, the winner is the buyer who submitted the highest bid in a sealed bid forward auction and seller who submitted the lowest bid in a sealed bid reverse auction.

E. AUCTIONS IN THE MILITARY LABOR MARKET

In the military labor market, auctions are generally sealed bid reverse auctions where multiple sellers represented by military service members compete by submitting monetary bids to sell their labor commitments such as retention, separation, or transfer to a single buyer represented by the Department of Defense (Coughlan & Gates, 2010). Service members interested in staying in or leaving the military could submit bids for retention or separation. Based on targeted end strength goals, the services would decide how many retention or separation bonuses need to be awarded. Service members who

submit the lowest bids are the winners and would either be retained or separated. For example, if the Marine Corps want to separate 20 officers in a particular military occupational specialty officers who submit the 20 lowest bids are the winners and would receive a separation bonus.

Coughlan and Gates (2010) suggested that compared to traditional methods of assigning military retention bonuses, a retention auction can be more precise, cost effective, flexible, and induce voluntary participation. The same outcomes can be achieved applying auctions for assigning voluntary separation bonuses. While there are several variations of auctions that are applicable to the military labor market, prior studies promoted using a uniform price reverse auction. The uniform price reverse auction and its application for assigning voluntary separation bonuses will be examined. For a detailed explanation of bidding strategies, and the various types of auctions and their applications as military force management tools refer to: Coughlan, Peter J., Gates, William R., "Auction Mechanisms for Defense Management," in Parco, James E., Levy, David A. (eds.)*"Attitudes Aren't Free: Thinking Deeply about Diversity in the U.S. Armed Forces,"* Chapter 28.

1. Uniform Price Reverse Auction

The uniform price reverse auction is the multiple winner generalization of the second price sealed bid reverse auction where all winning bidders receive the same payment amount. The winning bidders are those who submit the lowest bid, but the actual payment they would receive is equal to the losing bidder who came closest to winning or the first excluded bid. For instance, in a uniform price reverse auction where there are 20 winners the 20 lowest sellers would receive a payment equal to the twenty-first lowest bid submitted.

Similar to the second price sealed bid reverse auction the optimal bidding strategy is for the sellers to bid their true reservation value in a uniform price reverse auction. If a person is bidding on an item they believe is valued at $100, then optimal bidding strategy is to bid exactly $100. If the bidder bids above his or her true reservation value of $100, then he or she risks bidding a price that is too high and could lose the auction. If the

bidder bids below his or her reservation value of $100, then he or she risks winning the auction at a price that is below their true reservation value when he or she may have won and received a payment at or above their true reservation value. As it pertains to a uniform price reverse auction for assigning voluntary separation bonuses, the reservation value is the minimum payment a service member would accept to voluntarily leave the military.

To illustrate the cost savings that can be achieved using a uniform price reverse auction instead of the special separation benefit program for assigning a voluntary separation bonus, the following scenario reveals the outcome. Suppose during post-Cold War drawdown the Marine Corps wanted to reduce the number of captains with 6 to 8 years of service in a specific military occupational specialty. There are 50 captains in the military occupational specialty and the Marine Corps wants to separate 30% of the officers. Using the special separation benefit lump sum formula, the average captain with 6 to 8 years of service would receive a payment of $46,219 using a 1992 military pay chart. Under the special separation benefit program, $46,219 is a fixed amount and all captains with 6 to 8 years of service would receive a payment of $46,219, regardless of whether individuals would have separated for less money. Using the special separation benefit program, it would cost the Marine Corps $693,285 for separation bonuses for 15 officers. Fifty percent of the cost or $346,642.50 was economic rent paid to officers who would have separated without the special separation benefit offer or for a lesser special separation benefit payment amount.

The Marine Corps could reduce the cost associated with separating the 15 officers using a uniform price auction. In the auction, multiple sellers represented by captains with 6 to 8 years of service would compete by submitting sealed bids reflected by their true reservation value to sell their labor commitment or separation to the Marine Corps. In the scenario described above, if the reservation value for each officer participating in the auction is uniformly distributed between $0 and $70,000, the Marine Corps would pay separation bonuses to the 15 officers who submit the lowest bids. The amount paid to the 15 winning officers would equal the amount submitted by the sixteenth lowest bidder or first excluded bid. Table 1 illustrates the results of a uniform price auction for separating 15 officers in a specific MOS. In the auction randomly generated bids ranging from $0 to $70,000 are used to denote the reservation values of 50 officers participating in the auction.

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Table 1.   Uniform Price Reverse Auction for a Given Marine Corps MOS

Rank	Bid	Separated	Bonus Received
50	69544	0	
49	60836	0	
48	55579	0	
47	54537	0	
46	54425	0	
45	51541	0	
44	51075	0	
43	49845	0	
42	48972	0	
41	48317	0	
40	47227	0	
39	45675	0	
38	45301	0	
37	45138	0	
36	43442	0	
35	42082	0	
34	40657	0	
33	40509	0	
32	38172	0	
31	35498	0	
30	35223	0	
29	35220	0	
28	35003	0	
27	34538	0	
26	34287	0	
25	33290	0	
24	33271	0	
23	30939	0	
22	30298	0	
21	29927	0	
20	29786	0	
19	29135	0	
18	27469	0	
17	27441	0	
16	26806	0	
15	26696	1	26806
14	21744	1	26806
13	21430	1	26806
12	21366	1	26806
11	19118	1	26806
10	18900	1	26806
9	17685	1	26806
8	16791	1	26806
7	16480	1	26806
6	16128	1	26806
5	15809	1	26806
4	13113	1	26806
3	7581	1	26806
2	2309	1	26806
1	1678	1	26806
Total Separation Bonus paid			**$402,090.00**

The results showed that significant cost savings were achieved using a uniform price reverse auction in lieu of the special separation benefit lump sum to assign voluntary separation bonuses. The amount paid to the 15 winning officers was $26,806, the sixteenth lowest bid, or first excluded bid, which is considerably less than the average amount of $46,219 paid under the special separation benefit option.

2. Quality Adjusted Discount (QUAD) Auction

In today's military, one of the main manpower goals is to increase the quality of enlisted and officer service members while reducing manpower cost. To do so, the military services must recruit and retain highly qualified service members. Prior auction studies generally concentrate on how manpower planners can reduce the cost and increase the efficiency associated with assigning special incentive pay and bonuses. These studies rarely examine the quality of personnel receiving the special incentive pay and bonus. White (2010) explored using a quality adjusted discount auction to assign aviation continuation pay to eligible aviation officers while attempting to retain higher quality aviation officers. The author was the first to apply a control measure for the quality of personnel when using an auction mechanism.

a. Quality Adjusted Discount Auction (QUAD) for Retention

The quality adjusted discount auction is a uniform price reverse auction which controls for quality by providing a monetary discount payment to bidders with higher quality ratings. The auction works under the assumption that a higher quality bidder would have a higher reservation value and will submit higher bids. Bidders with the predetermined quality rating of q^* or greater would have their bids reduced by A to compensate for their higher reservation value. Like all reverse auctions the quality adjusted discount is characterized by a single buyer; whereby, the single buyer is the Department of Defense and the multiple sellers are military service members.

During the quality adjusted discount auction, the objective of the bidder, O_i, represented by service members, is to maximize his or her payoff (p_i) by submitting a bid (b_i) that reflects his or her true reservation value (r_i) for staying on active duty.

The objective of the buyer represented by the Department of Defense, is to retain M number of service members at the lowest cost. In a retention context, the model assumes that an assistance of $\$A$ dollars is authorized for any service member with a quality rating of at least q_i^*. After receiving all bids a quality adjusted bid b_i^* is calculated as:

$$b_i^* = \begin{cases} b_i & \text{if } q_i < q^* \\ b_i - A & \text{if } q_i \geq q^* \end{cases}$$

The buyers then rank all quality adjusted bids from highest to lowest and retain the X number of service members with the lowest b_i^*. All service members who are retained are paid an amount equal to the first excluded bid. In this case, the first excluded bid is the X+1 service member who bids b^*. Any service members with a quality adjusted bid $(b_i^*) < b^*$ are retained and receive a bonus computed as:

$$p_i = \begin{cases} b^* & \text{if } q_i < q^* \\ b^* + A & \text{if } q_i \geq q^* \end{cases}$$

b. *Quality Adjusted Discount Auction (QUAD) for Separation*

This section draws from a memo on QUAD auctions conducted by Dr. Noah Myung at the Naval Postgraduate School. In his memo, the QUAD model described above is modified to a voluntary separation application. As a separation auction for voluntarily separating Marine Corps Officers, the single buyer in the QUAD auction is represented by the Marine Corps manpower planners and the multiple sellers were represented by Marine officers who voluntarily choose to participate in the auction. Like a QUAD auction for retention, the QUAD auction for separation would control for quality by providing a monetary assistance of (A) to the bids of officers with higher quality ratings (q^*).

In this QUAD auction, the objective of the Marine officers is to maximize their payoff (p_i) by submitting a bid (b_i) that reflects his or her true reservation value (r_i) for separating from the military. The objective of the buyer represented by the Marine Corps Manpower Planners was to separate N number of officers at the lowest cost. The

model assumes that an assistance of $A is authorized for any officer with a quality rating of q_i* or greater. After receiving all bids, a quality adjusted bid, b_i* is calculated as:

$$b_i* = \begin{cases} b_i & \text{if } q_i < q^* \\ b_i + A & \text{if } q_i \geq q^* \end{cases}$$

Marine manpower planner (USMCMP) then rank all quality adjusted bids from highest to lowest and separate the M number of officers with the lowest quality adjusted bid (b_i*). Therefore, USMCMP will retain the $N−M$ most expensive bidders. All officers who are separated are paid an amount equal to the first excluded bid. In this case, the first excluded bid is the $M+1$ officer who bid $b*$. Any officer with a quality adjusted bid (b_i*) < $b*$ are separated and receive a bonus computed:

$$p_i = \begin{cases} b^* & \text{if } q_i < q^* \\ b^* - A & \text{if } q_i \geq q^* \end{cases}$$

To illustrate the auction process, the following scenario reveals the outcome. Two officers are bidding in a quality adjusted discount auction for separation. Both officers bid (b_i) $60,000, but officer A has the required quality rating (q^*) and officer B does not. Marine manpower planners are authorized to provide ($A) $10,000. Since officer A has the required quality rating his or her initial bid is increased by $10,000 ($b_i$ + $A). Officer A's quality adjusted bid (b_i^*) is $70,000. Officer B does not have the required quality rating and his or her quality adjusted bid (b_i^*) is his initial bid of $60,000. The quality adjusted bids are ranked and the first excluded bid in the auction is $80,000. Since both officers' quality adjusted bids are less than $80,000, they are selected for separation. The higher quality officer A will receive a payment of $70,000 ($b_i^*$ - $A), which is lower than officer B who receives a payment of $80,000. If a quality adjusted discount auction is used for assigning voluntary separation bonuses, higher quality officers will receive lower separation bonuses than low quality officers.

F. BIDDING STRATEGY IN A QUAD AUCTION FOR SEPARATION

Since officers are not separated if their bids are rejected, the optimal bidding strategy is to bid one's true reservation value. Therefore, an officer's bid should accurately reflect his or her true reservation value for separating from the military. To illustrate how an officer can do no better than bidding truthfully, consider the following example. A quality officer is participating in a QUAD auction for separation. His reservation value for separating from the military is $100,000. Thus, his bid for separation should reflect this amount. A quality adjustment allowance of $10,000 is authorized. The officer can choose one of three bidding strategies: overbidding, underbidding and bidding his or her true reservation value. Table 2 shows the results from using the three bidding strategies when the cutoff bids, or first excluded bid, are $115,000, $110,000 and $105,000.

Table 2. Optimal Bidding Strategy in a QUAD Auction for Separation

Reservation Value:$100,000	If Cutoff Bid is $115,000	If Cutoff Bid is $110,000	If Cutoff Bid is $105,000
Underbid $90,000	Separated at $105,000	Separated at $100,000	Separated at $95,000
Truthfully Bid $100,000	Separated at $105,000	Retained at $100,000	Retained at $100,000
Overbid $110,000	Retained at $100,000	Retained at $100,000	Retained at $100,000

Table 2 illustrates that it is not optimal to overbid or under bid. Whenever the officer overbids they face the possibility they will lose the auction and be retained when they would prefer to accept the separation bonus. For instance, when the officer overbids at $110,000 and the cutoff bid is $115,000, the officer's quality adjusted bid is $120,000.

Since the quality adjusted bid is greater than the cutoff bid, the officer is retained at his opportunity cost for leaving the military. When the officer underbids, he or she risks winning the auction at price less than their reservation value. For instance, when the officer underbids at $90,000 and the cutoff bid is $105,000, the officer's quality adjusted bid is $110,000. Since the quality adjusted bid is less than the cutoff bid, the officer is separated and receives $95,000. This amount is less than his or her opportunity cost for leaving the military.

The table also illustrates that by bidding's one's true reservation value the officer will always receive an amount greater than or equal to their opportunity cost for separating from the military. Therefore, the officer can do no better than truthfully bidding his or her reservation value.

G.   CHAPTER SUMMARY

The study has examined auctions and their application to the military. The study focused on the effectiveness of a uniform price reverse auction and its application to: (a) assigning separation bonuses and (b) retaining high-quality personnel. As an alternative mechanism for assigning voluntary separation lump sum bonuses, the uniform price reverse auction can be a cost effective means of reducing the substantial economic rent associated with traditional separation incentive programs.

To retain quality personnel, the auction must be modified. The modified auction is called a quality adjusted discount and involves assigning a monetary assistance to higher quality personnel. Higher quality officers who were separated would receive a lower bonus than low quality officers. Under other normative economics, such as pareto-optimality, for example, efficiency rather than fairness is considered. Giving everything to one person and zero to everyone else is efficient under pareto-optimality (Myung, 2011). It is necessary to pay less to higher quality officers for the quality adjusted discount auction for separation to be efficient.

IV. VOLUNTARY SEPARATION SURVEY

A. INTRODUCTION

The study posits that there should be a strong positive correlation between a higher quality officer and the amount of compensation he or she would accept to voluntarily separate from the military. Higher quality officers were expected to have higher reservation values. To test the hypothesis, it was necessary to establish a matrix which attempts to quantify the attributes of a quality Marine Corps officer. A survey administered to approximately 500 Marine Corps officers assigned to the Naval Postgraduate School, Marine Corps detachment at the, Presidio of Monterey, and I Marine Corps Expeditionary Force (MEF) was used to measure attributes of a quality officer.

B. SURVEY DEVELOPMENT, PRE-TESTING AND APPROVAL

The questions in the survey were developed based on factors that: (a) determine a quality officer and (b) influence a Marine's decision to stay or leave the military. Factors include promotion potential, performance, outside civilian pay offers, marital-dependent status, graduate education, leadership experience, and time spent in primary military occupational specialty. To maximize the effectiveness of the survey, a draft version of the survey was pretested with a small cohort of Marine Corps officers in the graduate school of business and public policy at the Naval Postgraduate School. A request was sent to chief of staff of I Marine Corps Expeditionary Force and the commanding officer of Marine Corps detachment, Presidio of Monterey to obtain approval to administer the survey to unrestricted officers assigned to their units.

After making revisions from the pretest and receiving approval from I Marine Corps Expeditionary Force and Marine Corps detachment, Presidio of Monterey an application was submitted to the Naval Postgraduate School's institutional review board (IRB). The review board is responsible for approving all research that involves contact with human subjects. Once the survey and protocol proposed for the study were reviewed

and approved by the Naval Postgraduate School's IRB the survey was administered to Marine Corps officers assigned to Naval Postgraduate School, Marine Corps detachment, Presidio of Monterey and I Marine Corps Expeditionary Force.

C.   SURVEY DELIVERY MECHANISM

To administer the survey to officers at I Marine Corps Expeditionary Force an electronic mail was sent to I Marine Corps Expeditionary Force's assistant chief of staff requesting he disseminate the survey invitation to all officers in I Marine Corps Expeditionary Force. After obtaining the electronic mail addresses of all Naval Postgraduate School and Defense Language Institute (DLI) officers a mass electronic mail was sent inviting them to participate in the survey. The electronic mail invitation included: (a) an explanation of the survey's purpose, (b) the link to the survey, and (c) that all responses were voluntary and anonymous.

In both cases, the survey was administered using Survey Monkey which is an online data collection service. The survey was available to I Marine Corps Expeditionary Force officers from December 13 to December 27, 2010, and to officers at Naval Postgraduate School and Defense Language Institute from January 12 to January 26, 2011. The survey is currently closed and a copy is included in Appendix A.

D.   POPULATION AND SAMPLE STATISTICS

According to the most recent report on population representation in the military, there are 17,833 unrestricted officers in the Marine Corps. The survey was distributed to approximately 500 unrestricted officers or 2.8% of the Marine Corps' officer population. Of the 231 responses collected, an average of 26 questions were skipped. The response rate for the survey was 41%.

The survey sample provided a fairly approximate representation of the Marine Corps' officer population. A comparison of socio-demographic characteristics in the sample and Marine Corps' officer population is shown in Table 3. Hispanics and Asians were overrepresented in the sample, and African Americas were underrepresented in the sample. Officers with the rank of O-3 and O-4 were overrepresented and with the rank of

O-1 were underrepresented. Of the total sample, captains and male participants accounted for 42.1% and 95.8%, respectively. Married participants totaled 72.6% and the average years of service were 12 years. About 22% of the sample had a graduate education.

Table 3.   Population and Sample Statistics

	Population	Sample
Male	94.20%	95.80%
Female	5.88%	4.20%
White	82.57%	78.70%
Black	5.15%	3.20%
Hispanic	6.54%	10.60%
Asian	2.44%	4.20%
Other	3.30%	3.30%
O-1	17.10%	3.20%
O-2	17%	18.10%
O-3	31.40%	42.10%
O-4	20.90%	25%
O-5	9.60%	8.30%
O-6	3.65%	3.20%
Married	65.53%	72.60%
Unmarried	34.47%	27.40%

E.   RESULTS

The survey provided the necessary data to conduct all analysis in the study. The primary goals of the survey were: (a) to identify the minimum compensation a Marine officer would accept for voluntary separation and (b) to collect data to establish a quality score rating to be used in a quality adjusted discount auction. The secondary focus of the survey was to ascertain the likelihood of Marine officers' participation in a voluntary separation program and to collect data to conduct regression analysis.

1. Voluntary Separation Participation

Regarding participation in a voluntary separation program 22.3% of respondents reported that they were likely to participate, 21.5% were unsure, and 56.2% reported they were unlikely to participate or would not consider voluntary separation. Figure 1 summarizes the distribution of the most common responses for not participating in a voluntary separation program. Sixty percent of the respondents indicated that retirement benefits were the primary reason for not participating in a voluntary separation program. The average year of service in the sample was more than 10 years. Officers with 10 plus years of service have a vested interest in the military as a career which is economically worthwhile for them to take advantage of retirement benefits.
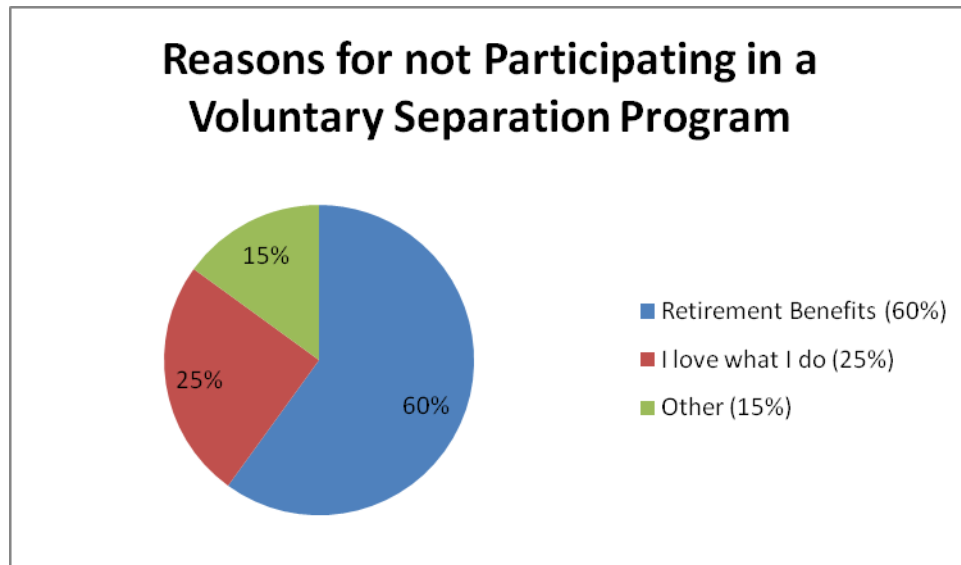
Figure 1.   Responses for Not Participating in a Voluntary Separation Program

2. Reservation Value (Lump Sum Payment)

One of the most important aspects of an efficient auction mechanism was for individuals to bid a price that reflected his or her true reservation value. To determine a Marine officer's reservation value for separating from the military, participants were asked the following question: What is the minimum monetary compensation you would require to be voluntarily separated from the military?

Of the 205 completed surveys, only 177 responses to the question were useful. Twenty six observations were deleted because respondents failed to provide a dollar amount. Respondents either entered not applicable or unknown, as a response to the question. The remaining two observations were deleted because the participants entered unrealistic dollar amounts. The values seem to indicate that no amount of compensation would induce the respondents to voluntarily separate from the military. Table 4 lists the average reservation values or lump sum bonus the respondents would be willing to accept in exchange for voluntary separation.

Table 4.   Average Reservation Value by Pay Grade

Pay Grade	Number of Observations	Average Lump Sum	Standard Deviation	Average Years of Service (YOS)
O-1	5	$170,000.00	$195,576.07	2 yrs 4 months
O-1E	2	$55,000.00	$7,071.07	7 yrs
O-2	28	$82,300.00	$95,273.90	3 yrs 6 months
O-2E	8	$232,500.00	$395,618.86	11 yrs 2 months
O-3	54	$249,629.00	$318,871.26	8 yrs
O-3E	20	$592,500.00	$669,222.84	15 yrs 6 months
O-4	47	$360,212.00	$395,972.88	14 yrs 8 months
O-5	11	$247,272.00	$419,478.03	20 yrs 4 months
O-6	2	$85,000.00	$49,497.47	28 yrs
Sample	177	$284,000.00	$399,081.92	10 yrs 8 months

With the exception of second lieutenants, prior enlisted first lieutenants and captains had significantly higher average reservation values than their non prior counterparts. This suggests that prior enlisted officers would require a more lucrative separation offer to induce voluntary separation from the military. The average reservation values for field grade officers decreased with rank and years of service. Lieutenant colonels and colonels had more years of service but lower average reservation values compared to majors. The decreased average reservation values associated with field grade officers may be a result of the officers being retirement eligible. The assumption is that

field grades, such as lieutenant colonel and colonel leaving the military, would receive retirement benefits in addition to their expected civilian earnings so they could afford to accept a lower lump sum payment.

a.   Comparison Between Survey Lump Sum, SSB Payment and Retirement Pay Forgone

When offered to participate in a voluntary separation program, a Marine officer must make a decision to either accept the separation offer or refuse the offer and remain on active duty with the expectation of reaching retirement. There are several factors that influence the decision to accept a lump sum payment: expected civilian pay, availability of jobs in civilian labor market, retirement pay foregone, marital status and number of dependent. The study will focus on comparing the present value of a lump sum payment with the retirement pay forgone. The average lump sum requested by captains with 8 years of service will be compared with the lump sum he or she would receive under the special separation benefit program.

To calculate the retirement pay streams for Captains with 8 years average YOS, this study used the Office of the Secretary of Defense (OSD) military compensation High-3 retirement calculator (Office of the Secretary of Defense, reference 2, n. d.). The following assumptions were made:

1.   All captains were promoted to O-4 before retirement.

2.   Individuals retire with 20 years of service in 2011 under the High-3 retirement option.

3.   Forty-years old at retirement.

4.   An individual lives 40 years past retirement.

5.   Economic conditions include a 2% inflation rate, 2% annual active duty pay raise, and a 25% tax rate.

Based on the special separation benefit calculations, the average lump sum payment requested by captains with 8 years of service was more than three times the amount when compared to the previous method of assigning special separation benefit

bonuses. Captains requested an average lump sum of $249,629 which is far more than the $78,468 they would receive under a special separation benefit program. Of the 54 captains the modal lump sum requested was $100,000 which was requested by 14 captains. Another 15 captains requested a lump sum lower than $100,000 of which 12 were lower than $78,468. Therefore, 53.7% of the captains in the survey indicated they would voluntarily separate from the military if a lump sum of $100,000 or less was offered.

If Marine manpower planners were to implement new voluntary separation policies, the results would have yielded significant implications. The survey results suggested a voluntary separation offer that was similar to the special separation benefit which was too low to induce 47% of captains with 8 years of service to voluntarily separate. Since more than one-half of the captains indicated they were willing to accept $100,000 or less for voluntary separation, setting a separation bonus of $100,000 seemed reasonable. A separation bonus of $100,000 was commensurate with the Air Force's 2010 voluntary separation policy. To meet target end strength goals, the Air Force offered officers in specific military occupational specialty with 6 to 14 years of service a voluntary separation bonus equivalent to two times separation pay (Schogol, 2010, Air force wants to trim 5,750 people by 2012, para. 4). If the Marine Corps were to offer a similar separation policy, a captain with 8 years of service would receive a bonus of $104,624.

The reservation values for captains in the survey were used to examine the potential savings to the Marine Corps when an officer chooses early separation and waives full retirement pay. On average, a captain in the survey requested a lump sum payment of $249,629. Based on the retirement pay streams calculated using the Office of the Secretary of Defense military compensation High-3 retirement calculator, substantial cost savings were achieved when an officer waived retirement pay. A captain with 8 years of service who chose to accept a voluntary separation bonus of $249,629 waived over $2.4 million before taxes in retirement pay. Every captain who accepts early separation reduces future retirement cost to the Marine Corps by $2.4 million. Table 5 depicts the estimated retirement pay an O-4 rank would receive.

Table 5. Estimated Retirement Pay for an O-4 Retiring at 20 YOS

Years Out	Year	Before Taxes			After Taxes	
		Monthly Pay	Annual Pay	Cumulative	Annual Pay	Cumulative
1	2011	$3,431	$41,167	$41,167	$30,875	$30,875
10	2020	$4,100	$49,198	$450,763	$36,898	$338,072
20	2030	$4,998	$59,972	$1,000,240	$44,979	$750,180
30	2040	$6,092	$73,105	$1,670,050	$54,829	$1,252,537
40	2050	$7,426	$89,115	$2,486,544	$66,836	$1,864,908

Source: Office of the Secretary of Defense High-3 Calculator

3. Personal Discount Rate

Two questions from the survey were used to compute the personal discount rate for individuals in the sample. Participants were asked to identify the lump sum payment they would require for voluntary separation representing their present value of the offer. Participants were asked to identify an annuity payment they would accept for voluntary separation. They were asked to identify an annual payment for a period of time equaling two times his or her years of service they would accept for voluntary separation. The annuity payment represents their future value of the offer. Personal discount rates were then calculated using the following formula:

$$r = (FV/PV)^{1/Y}$$

Where future value is the annuity payment an officer would accept for voluntary separation. Present value is the lump sum an officer indicated he or she would accept for voluntary separation and Y is two times an officer's current years of service. Only 82 participants provided useable data to compute an officer's personal discount rate. Table 6 summarizes the average personal discount rates for officers in the sample.

Table 6. Computed Discount Rates

Pay Grade	Number of Observations	Personal Discount Rate (PDR)	Standard Deviation	Average Years of Service (YOS)
O-1	3	12%	0.04	2 yrs 4 months
O-2	17	18%	0.18	3 yrs 6 months
O-2E	3	7%	0.03	11 yrs 2 months
O-3	27	10%	0.09	8 yrs
O-3E	8	8%	0.12	15 yrs 6 months
O-4	18	5%	0.03	14 yrs 8 months
O-5	6	6%	0.02	20 yrs 4 months
Sample	82	10%	0.11	11 yrs 8 months

The results indicated the average discount rate for officers with less than 8 years of service was 13.3%. Officers with greater than 8 years of service had an average discount rate of 6.5%. If years of service is used as an indicator of age, the more years of service the older the individual, then the results were consistent with economic theory which suggested that younger individuals should discount income at a higher rate than older individuals (Mankiw, 2004).

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V.   QUALITY SCORE DEVELOPMENT AND RESULTS

A.   INTRODUCTION

Developing a matrix that measures the quality attributes of an officer is problematic because of the difficulty in quantifying quality. Recognizing this challenge, the study attempted to quantify quality by developing a matrix based on the following criteria: Performance evaluations, command experience, time spent in primary military occupation specialty (PMOS), combat experience, physical fitness scores, combat fitness scores, level of education and second language proficiency. The survey asked questions pertaining to the aforementioned criteria. This study explores four options to establish a quality matrix. The development process of the quality matrix in each option was conducted in two steps.

B.   SCORING PROCESS

The first step in the process is to develop a score for each assessment instrument used in the matrix. A score was assigned to each assessment instrument using a 3 or 4-point Likert-type response option with a numeric value assigned to each response option. For example, one question asked respondents for their current physical fitness (PFT) score, and a numeric value was assigned to each response option as follows:

Response Option	Response Value
First Class	3.00
Second Class	2.00
Third Class	1.00
Fail	0.00

The scoring of the matrix assigned a weight for the assessment instruments and multiplies the weight by the response value to obtain a weighted value. As a second step in the process, the weighted values for the assessment instrument were added to obtain an overall weighted value score for each respondent. After aggregating the weighted value scores for each respondent, a quality score is then assigned; whereby, higher quality

officers will have higher quality scores. The quality score (q*) is characterized by two values: *X* and *Y*, representing the total number of possible points and the number of points scored by each respondent, respectively. A value of 5 is assigned to indicate the highest possible quality score. The quality score is calculated as follows:

$$q^* = \frac{5(Y)}{X}$$

The process of assigning a weighted value for each assessment instrument used in each of the four options is described below.

1. Option 1

The first option computes a quality score based on four attributes that make a Marine Corps officer competitive for promotion. These attributes are: On the job performance, command and leadership experience, military occupational specialty credibility and physical fitness. In this option, different weights are assigned to each question. For example, more weight is given to the assessment instrument that evaluated a Marine's overall performance. The remainder of this study will use the quality score results obtained from option 1. This option measures the quality attributes which are most likely to be used in evaluating officers for promotion and retention.

a. *Performance*

A precise indicator of a quality officer is the Marine Corps' performance evaluation system (PES). The evaluation system requires an officer's immediate supervisor to evaluate his or her on the job performance using a fitness report. Coleman's (2010) commandant of the Marine Corps guidance on the performance evaluation system stated that:

> The completed fitness report is the most important information component in manpower management. It is the primary means of evaluating a Marine's performance. The fitness report is the commandant's primary tool available for selection of personnel for promotion, retention, augmentation, resident schooling, command, and duty assignment.

Therefore, the completion of this report is one of an officer's most critical responsibilities… (Coleman, 2010, Significance of the Fitness Report, pp. 1–4)

The study used the relative value at the time of processing (RV@PROC) to assign a quality score for an officer's performance. The relative value at the time of processing is a numeric value that reflects the relative value of a Marines' fitness report at the time the report is processed based on the reporting senior's rating history for Marines of that same grade. The value is based on a numerical system of 80 to 100 with 80 indicating the worst score, 100 indicating the best score, and 90 indicating the average score for that reporting senior (Coleman, 2010, Appendix G, p. G-3).

Since performance evaluations are the primary means of identifying a higher quality officer, more weight was given to this question. To compute a quality score using an officer's relative value at the time of processing, respondents were asked for the relative value at the time of processing of their last three observed fitness reports. An average relative value at the time of processing was computed for each respondent, and a numeric response value was assigned as follows:

Average RV@PROC	Response Value
80-85	1.00
86-90	2.00
91-95	3.00
96-100	4.00

This question was given a weight of 5 points. Therefore, a respondent with an average relative value of 92.5 would have a weighted value of 15 points (3 x 5).

b.   *Command and Leadership Billets*

Another indicator of a quality officer is the number of command, staff and special duty assignments he or she has completed. Command experience is probably the most valuable experience officers can have to be more competitive amongst their peers and to demonstrate his or her value to the Marine Corps. To assign a quality score for

command and leadership experience, respondents were asked if they held any command and staff positions during their military career. The assessment instruments were given a weight of 4, and 3 points respectively, and a numeric response value was assigned as follows:

Command Position	Staff Position	Response Value
Yes	Yes	1.00
No	No	0.00

Any respondent who answered yes to having held a command position would have a weighted value of 4 points.

Respondents were asked how many Joint Duty assignments they held throughout their military career. This assessment instrument was given a weight of two and respondents who indicated having held joint duty assignments were given a response value as follows:

Response Option	Response Value
0	0.00
1	1.00
2	2.00
3 or more	3.00

c.   Time Spent in PMOS and Combat Experience

All Marine officers are assigned a primary military occupational specialty (PMOS), and a military occupational specialty school prior to their first assignment in the fleet Marine force (FMF). The Marine Corps wants to have experienced and qualified officers serving in each military occupational specialty in an operational environment. The study used the amount of time an individual officer spent in his or her primary military occupational specialty and in the fleet Marine force, known as military occupational specialty credibility, as another indicator of a quality officer. One of the

assessment instruments asked respondents to state the years of service in their primary military occupational specialty. The question was given a weight of 4 and a numeric response value was assigned as follows:

Response Option	Response Value
0-2	1.00
3-4	2.00
5-6	3.00
7 or more	4.00

With the Commandant's guidance that all Marines are provided the opportunity to deploy to a combat zone, the study used the number of combat deployments to compute the quality score for an individual officer. Having a combat deployment combined with military occupational specialty credibility demonstrates that an officer is fully trained and qualified to perform successfully in an operational and combat environment. These are the officers the Marine Corps wants to retain on active duty. Respondents were asked to identify the number of combat deployments they have completed in their military career and in their primary military occupational specialty. This assessment instrument was given a weight 3, and a numeric response value was assigned as follows:

Response Option	Response Value
0	0.00
1-2	1.00
3-4	2.00
5 or more	3.00

d. Physical Fitness

Physical fitness is an integral part of Marine Corps' training and performance on the battle field. As leaders, officers need to demonstrate high levels of physical fitness by achieving first class physical fitness (PFT) scores and combat fitness (CFT) scores. To compute a quality score based on physical fitness, respondents were

asked for their current physical fitness and combat fitness scores. The assessment instruments were given a weight of 1 point, and assigned a numeric response value as follows:

Response Option	Response Value
First Class	3.00
Second Class	2.00
Third Class	1.00
Fail	0.00

2. Options 2, 3 and 4

To show differences in the scoring distribution of the quality matrix, it is necessary to look at alternative methods to develop a quality score. Option 1 uses 8 assessment instruments and assigns different weights to each. In option 2, the quality score was computed using attributes similar to option 1: On the job performance, command and leadership experience, military occupational specialty credibility, and physical fitness. Option 2 assigned equal weight to each of the 8 assessment instruments.

Option 3 reduced the number of assessment instruments and a quality score was developed based on performance and military occupational specialty credibility. Similar to Option 1 different weights were assigned to each assessment in Option 2. The fourth option increased the number of assessment instruments used in option 1 and assigned equal weights to each. Option 4 included level of education and language proficiency, as additional criteria that demonstrated a Marine officer's value to the Marine Corps.

3. Computed Quality Scores

The overall quality scores were computed using Options 1 and 2 are illustrated below. Respondent A's response to assessment instrument questions:

Q1.   Under the Performance Evaluation Summary what was the "Relative Value at Processing" (RV at Proc) of last three fitness reports? Answer: **89, 93, 96**.
Therefore **RV@PROC= 92.7**

Q2. In your military career have you held a command position where you held NJP authority? Answer: **Yes**

Q3. In your military career have you held any staff positions, i.e. executive officer, operations officer? Answer: **Yes**

Q4. How many Joint Duty Assignments have you held in your military career? Answer: **2**

Q5. Years/months of service in primary MOS? Answer: **3 years 4 months**

Q6. How many combat deployments (6 months or more) have you completed in your primary MOS? Answer: **2**

Q7. What is your current PFT Score? Answer: **First Class**

Q8. What is your current CFT Score? Answer: **First Class**

Based on respondent A's answers to the assessment instrument questions when different weights are assigned, this respondent would receive a quality score of 3.21 points. Table 7 provides an example of how a quality score is computed for respondent A when different weights are assigned to the assessment instruments.

Table 7.   Computed Quality Score When Different Weights are Assigned

Question	Response	RV	x	Weight	= Weighted Value	Max Points(X)
Q1.	92.7	3		5	15	20
Q2.	Yes	1		4	4	4
Q3.	Yes	1		3	3	3
Q4.	2	1		2	2	6
Q5.	3yrs 4mths	2		4	8	16
Q6.	2	1		3	3	9
Q7.	1st Class	3		1	3	3
Q8.	1st Class	3		1	3	3
SUM					$Y = 41$	$X = 64$

$$q^\wedge = \frac{5(41)}{64} = 3.21$$

When an equal weight is assigned to each assessment instrument, regardless of value, respondent A's quality score increases to 3.41 points. Table 8 illustrates

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respondent A's quality score when a weight of 5 is assigned to each assessment instrument. The quality scores for Options 3 and 4 are computed in a similar manner.

Table 8.   Computed Quality Score When Equal Weights are Assigned

Question	Response	RV	x	Weight	Weighted Value	Max Points(X)
Q1.	92.7	3		5	15	20
Q2.	Yes	1		5	5	5
Q3.	Yes	1		5	5	5
Q4.	2	1		5	5	15
Q5.	3yrs 4mths	2		5	10	20
Q6.	2	1		5	5	15
Q7.	1st Class	3		5	15	15
Q8.	1st Class	3		5	15	15
SUM					**$Y = 75$**	**$X = 110$**

$$q^* = \frac{5(75)}{110} = 3.41$$

C.   QUALITY SCORE RESULTS

The quality score rating was developed based on the data from the survey. Four different options were explored in computing the quality score. The number of useable observations was limited by the development process of the quality score rating. The main assessment instrument used in each of the quality score options was the average relative value at the time of processing. Survey participants were asked to identify the relative value at the time of processing of their last three observed fitness reports. Of the 127 participants who answered the question 86 were useable. One observation was deleted because his or her bid of $6 million was too high. This suggests that no amount of incentive would induce the respondent to accept voluntary separation. The remaining 40 observations were deleted because incorrect information was provided. For example, several respondents entered not applicable (n/a), unknown, or their reporting officer's ranking.

When applied to the sample, each option produced varying descriptive statistics. There was a strong positive correlation between the top one-third quality scores in each option. The correlation coefficients ranged from 0.93 and 0.97 indicating that the same individuals were selected in the top one-third of every option. A weak positive correlation ($r = 0.15$) was found between high-quality officers and the amount of compensation, reservation value he or she would be willing to accept for voluntary separation from the military. The result was consistent with prior assumptions that higher quality officers would have higher reservation values. A plot of the reservation values and quality scores in the data produces the following graph:
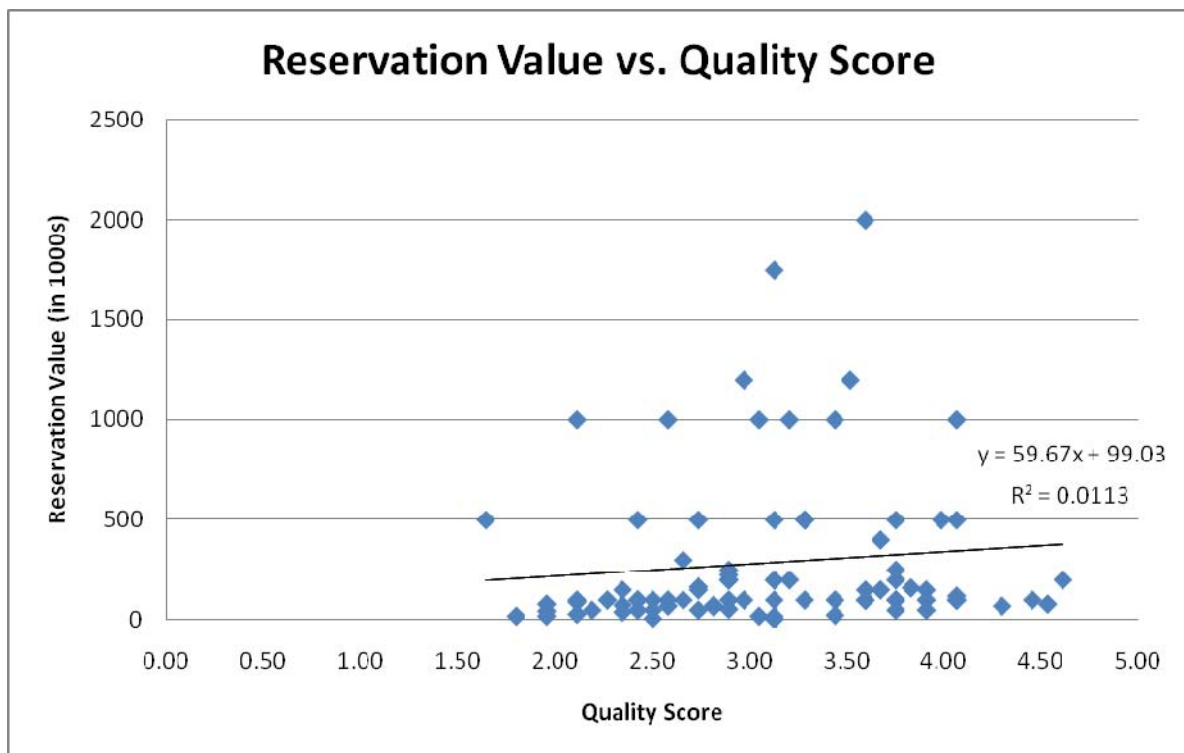
Figure 2.   Plot of Reservation Value Vs. Quality Score

The graph of reservation value and quality score confirms that the data is not perfectly linear ($R^2 = 0.0113$). The slope or rate of change of the trend line is 59.67, which implies that the average reservation value in the sample is increasing by approximately $60,000 with every one point increase in quality score.

When the results from the first option were applied to the sample, the mean quality score was 3.11 points, modal quality score was 3.13 points, standard deviation was 0.68, and minimum and maximum quality scores were 1.64 points and 4.61 points, respectively. In the second option, the mean quality score increased to 3.22 points, modal quality score increased to 3.18 points with a standard deviation of 0.51, and the sample had a minimum and maximum quality score of 2.27 points and 4.55 points, respectively. In the third option, the mean quality score was 3.32 points, the modal quality score was 3.44 points, the standard deviation was 0.80, and the minimum and maximum quality scores were 1.33 points and 5.00 points, respectively. In the fourth option, the mean quality score was 3.02 points, the modal quality score was 3.00 points, the standard deviation was 0.58, and the minimum and maximum quality scores were 2.00 points and 3.02 points, respectively. Table 9 shows the correlation between the top 1/3 quality scores from each of the four options.

Table 9.   Correlation Between the Top 1/3 Quality Scores

	Option 1	Option 2	Option 3	Option 4
Option 1	1	0.96	0.95	0.97
Option 2	0.96	1	0.92	0.95
Option 3	0.95	0.96	1	0.93
Option 4	0.97	0.95	0.93	1

VI. AUCTION SIMULATIONS

A. INTRODUCTION

Once the quality score matrix was developed the next step was to apply the quality scores to a quality adjusted discount model. The objective of using the model was to determine if the Marine Corps can increase the overall quality of officers retained while reducing the total amount of voluntary separation bonuses paid to departing officers. To do so, quality gains and cost savings were evaluated by comparing the results from a standard uniform price auction to those achieved from a uniform price quality adjusted discount auction. The results from the survey provided the data to conduct several auction simulation runs using an Excel model. The survey provided the bidders and their reservation values for separating from active duty. The key variables and definitions used in each separation model were similar to those in the retention auction used by White (2010).

1. Definition of Terms

Reservation value or bid: Survey respondents were asked how much compensation or lump sum payment, he or she would accept to voluntarily separate from the military. The amounts were used as the reservation values for officers in the model.

Quality rating: Each officer in the model received a quality score ranging from 1 to 5 points.

q*: The quality rating identifies the higher quality officers. Officers with quality scores greater than or equal to q^* are higher quality officers and qualify for the quality adjusted discount.

$A: The Department of Defense authorized allowance given to officers with quality scores greater or equal to q^*.

Quality adjusted discount bid: To arrive at a quality adjusted bid, the Department of Defense authorized allowance ($*A*) is added to the initial bids submitted by officers possessing a quality score greater or equal to q^*.

Rank: Indicates the standing of each bidder after computing quality adjusted discount bids and ranks them from highest to lowest.

Bonus received: In the quality adjusted discount auction, officers with the lowest quality adjusted bids the winners and will receive a bonus equal to the first excluded.

Target: The number of officers the Marine Corps wants to separate in order to meet end strength goals.

B.   MODEL ASSUMPTIONS AND RESULTS

To conduct the uniform price and the quality adjusted discount auction for separation simulations, the evaluation variables and design characteristics were entered into an Excel model. The following assumptions were made:

- The 86 respondents represent Marine officers in a specific MOS and they volunteer to participate in a separation auction.
- Each model assumes different targeted separation goals. The Marine Corps will separate 73, 56 and 43 of the 86 officers who choose to participate in the auction.
- Auction bids are the lump sum payment (reservation value) each officer requested for voluntary separation. The bids range from $5,000 to $2 million.

1.   Standard Uniform Price Auction Simulations

To simulate the uniform price auctions, the auctions will assume the goal is to separate 43, 56 and 73 out of 86 officers in a given MOS. If the goal is to separate 43 officers, with a uniform price auction the Marine Corps will assign voluntary separation

bonuses to the 43 officers with the lowest reservation value for separation. The 43 officers who submit the lowest bids are the winners but would receive a bonus equivalent to the forty-forth bid or first excluded bid.

Based on the aforementioned example using a uniform price auction to separate 43 officers, it would cost the Marine Corps $5.5 million. A similar model is run for target separation goals of 56 and 73. As expected, the target separation goals increased total cost. Table 10 compares the cost and average quality officers retained using the different target separation goals.

Table 10.   Separation Cost and Average Quality Using a Uniform Price Auction

Target Separation=73	Target Separation=56	Target Separation=43
Total Cost= $76,000,000	Total Cost= $13,725,000	Total Cost= $5,520,000
Avg. Quality = 3.16	Avg. Quality = 3.16	Avg. Quality = 3.24
Bonus Paid = $1,041,095	Bonus Paid = $245,089	Bonus Paid = $128,372

2.   QUAD Auction Simulations

The quality adjusted discount simulations used the same target separation goals and assumptions as above. A monetary allowance of A was allocated to the bids of all officers with a quality rating greater or equal to q^*. Each simulation assumed the Marine Corps was authorized to give an allowance of A based on 25%, 50%, 75%, and 100% of the average reservation values or bids previously used. The quality adjusted discount simulations assumed that officers must possess a q^* rating greater than or equal to 3.43 to qualify for the allowance. The quality rating represents the cut off quality score for the top one-third high-quality officer in the sample. An officer was allocated an allowance only if his or her quality score was equal to or exceeded 3.43. His or her quality adjusted bid was then computed by adding A to their initial bid. Table 11 compares the cost to the Marine Corps an average quality officer retained using a quality adjusted discount auction that incorporates $q^* = 3.43$, $A = $70,000, $140,000, $212,500, $284,000 and target separation goals of 43, 56, and 73.

Table 11.   Separation Cost and Average Quality Gains Using a QUAD Auction

$A	Target Separation= 43	Target Separation= 56	Target Separation = 73
$0	Cost= $5,520,000	Cost= $13,725,000	Cost= $76,000,000
	Avg. Quality = 3.24	Avg. Quality = 3.16	Avg. Quality = 3.16
	Bonus Paid = $128,372	Bonus Paid = $245,089	Bonus Paid = $1,041,095
$70,000	Cost= $8,330,000	Cost= $11,790,000	Cost= $40,000,000
	Avg. Quality = 3.28	Avg. Quality = 3.25	Avg. Quality = 3.34
	Bonus Paid = $193,720	Bonus Paid = $205,357	Bonus Paid = $547,945
$140,000	Cost= $8,610,000	Cost= $12,600,000	Cost= $43,5000,000
	Avg. Quality = 3.48	Avg. Quality = 3.36	Avg. Quality = 3.34
	Bonus Paid = $200,232	Bonus Paid = $225,000	Bonus Paid = $595,890
$212,500	Cost= $11,075,000	Cost= $15,977,500	Cost= $47,125,000
	Avg. Quality = 3.53	Avg. Quality = 3.38	Avg. Quality = 3.34
	Bonus Paid = $257,558	Bonus Paid = $285,312	Bonus Paid = $645,547
$284,000	Cost= $11,287,000	Cost= $19,052,000	Cost= $50,700,000
	Avg. Quality = 3.55	Avg. Quality = 3.38	Avg. Quality = 3.34
	Bonus Paid = $262,500	Bonus Paid = $340,214	Bonus Paid = $694,520

Table 10 illustrates that offering increases in $A ranging from $70,000 to $284,000 weakly increased the average quality of officers retained. For example, when the target separation goal is 56, increasing $A from $70,000 to $140,000 increased average quality by 0.11 points. However, increases in $A greater than $140,000 resulted in no further increases in average quality. Additionally, offering increases in $A increased total cost. For instance, when the target separation goal is 43, increasing $A from $70,000 to $140,000, total increased cost by $280,000. Thus, as the QUAD allowance increases, the QUAD model retains higher quality officers at a greater cost.

a.   *Increasing the Target Separation Goal*

Increasing size of the target separation goal increased total separation cost. This is expected since more officers are being separated, and they are separated at a higher bonus. In almost every simulation, when the target separation goal is increased the average quality officer retained decreased. Such may be the case since some of the higher

quality officers who were retained at lower separation rates are now being separated when separation rates are higher. However, increasing the separation target from 56 to 73 and applying a QUAD of $70,000, the average quality officer retained increased from 3.25 to 3.34. This was the only simulation that produced quality gains when the target separation goal is increased.

b.   *Changing the Quality Rating (q*)*

The predetermined quality rating affects the total cost and quality gains using the uniform price QUAD auction. The results from a target separation goal of 56, $q^* = 3.43$, and $A values discussed above are used as a baseline to compare the cost and quality gains if q* is either increased or decreased. Increasing the predetermined quality rating (q^*) from 3.43 to 3.74 increased the overall total cost when $A is increased incrementally. However, the average quality officer retained reduced weakly. For instance, increasing q^* from 3.43 to 3.74 when $A is $70,000, average quality increased by .02 points. However, increasing $A above $70,000 decreased average quality.

On the other hand, decreasing the quality rating from 3.43 to 3.11 decreased the quality of officer retained. However, the total cost varied depending on the value of $A applied. For instance, when an $A of $70,000 or $284,000 is applied, total cost decreased. Conversely, when an $A of $140,000 or $212,500 is applied, total cost increased. Table 12 illustrates the changes is cost and average quality when q* is either increased or decreased.

Table 12.   Changes in Cost and Average Quality When q* = 3.11 and 3.74
(Target Separation Goal = 56)

$A	q*= 3.11(Top 1/2)	q*= 3.43 (Top 1/3)	q* = 3.74 (Top 1/4)
$70,000	Cost= $11,270,000	Cost= $11,790,000	Cost= $11,770,000
	Avg. Quality = 3.25	Avg. Quality = 3.26	Avg. Quality = 3.28
	Bonus Paid = $201,250	Bonus Paid = $205,357	Bonus Paid = $210,178
$140,000	Cost= $13,880,000	Cost= $12,600,000	Cost= $12,850,000
	Avg. Quality = 3.27	Avg. Quality = 3.36	Avg. Quality = 3.32
	Bonus Paid = $247,857	Bonus Paid = $225,000	Bonus Paid = $229,464
$212,500	Cost= $16,137,500	Cost= $15,977,500	Cost= $17,492,500
	Avg. Quality = 3.30	Avg. Quality = 3.38	Avg. Quality = 3.36
	Bonus Paid = $288,169	Bonus Paid = $285,312	Bonus Paid = $312,366
$284,000	Cost= $19,220,000	Cost= $19,052,000	Cost= $20,996,000
	Avg. Quality = 3.30	Avg. Quality = 3.38	Avg. Quality = 3.36
	Bonus Paid = $343,214	Bonus Paid = $340,214	Bonus Paid = $374,928

The results of the auction simulations allow Marine Corps Manpower Planners to be flexible when trying to allocate funds for voluntary separation. The QUAD auction allows planners to set a precise bonus amount to attain specific target separation goals, depending on a separation budget. Assuming the separation budget for officers is set at $13 million, retaining the top 1/3 officers with $q* \geq 3.43$ and an $A of $140,000 yields the highest quality gains, but at the highest cost. However, quality gains at $A of $140,000 are only 0.1 more than the average quality achieved when $A is $70,000 for the same value of $q*$.Therefore, it would cost $810,000 to achieve a 0.1 point increase in average quality. Having a quality score increase of 0.1 is equivalent to having an additional Joint Duty assignment. Based on the quality matrix, an officer with one additional Joint Duty Assignment increases his/her quality score by 0.1 points. Thus, there is a tradeoff between cost and quality.

Although the bids and the value of $A remained unchanged in all simulations, the results were not consistent. The inconsistencies that occurred by increasing the target separation goal and by changing the predetermined quality rating may be a result of the weak correlation between high-quality officers and his or her

reservation values. If there was a strong positive correlation, one may expect average quality to always increase depending on the value of A, the actual bid amounts, and the target retention goal (White, 2010).

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VII. MULTIVARIATE MODELS AND RESULTS

A. DATA SET AND VARIABLE DESCRIPTION

Using the data collected from the survey, this study examined the personal, professional and economic factors that have a significant effect on a Marine officer's decision to participate in a voluntary separation program. The data retrieved from the survey contained 205 observations. Of the 205 observations, 10 were dropped because of missing values. It was expected that the probability of an officer who chose to participate in a voluntary separation program was a function of gender, race, marital status, number of dependents, pay grade, education level, years of service, military occupational specialty, expected civilian earnings and personal discount rate. Responses from the survey provided information for the variables. Table 13 shows an overview of the variables and their definitions.

Table 13.   Variables From the Voluntary Separation Survey

Variable	Variable Definition
VSIP_Part	1= yes to participating in a voluntary separation program; 0 otherwise
Gender	1= Female; 2= Male
Race	1= Asian
	2=Black/African American
	3=Other
	4=Spanish/Hispanic Descent
	5= White
Marital Status	1= Divorced
	2= Married
	3= Single
	Number of non-spouse dependents

Number of Dependents	
	1= 0 dependents
	2= 1-2 dependents
	3 = 3 or more dependents
Military Occupational Specialty (MOS)	1= Aviation (pilots fixed or rotary wing)
	2= Aviation Support
	3= Combat Arms
	4= Combat Service Support
Education	1= Bachelor's
	2= Master's
	3= Doctorate
Pay Grade	1= O-1
	2=O-1E
	3= O-2
	4= O-2E
	5= O-3
	6= O-3E
	7= O-4
	8= O-5
	9=O-6
Years of Service (YOS)	1= 1-3
	2= 4-10
	3= 11-15
	4=16-22
	5=23 and above
Personal Discount Rate (PDR)	Rate at which Officers trade current dollars for future dollars
Quality Score	A 1-5 scale ranking of Marine officers based on quality attributes
Expected Civilian Pay	Annual pay a Marine expects to receive in the civilian labor market

B. EMPIRICAL MODEL

Given the specific variables collected from the survey, the base empirical model used to estimate the probability of an officer's choice about whether or not to participate in voluntary separation program was:

$$VSIP\_Part = \beta_0\, Female\ +\ \beta_2 Minority\ +\ \beta_3 num\_deps\ +\ \beta_4 O1\ +\ \beta_5 O2\ +\ \beta_6 02E\ +\ \beta_7 O3\ +\ \beta_8 O3E\ +\ \beta_9 Aviators\ +\ \beta_{10} Aviaition\_Support\ +\ \beta_{11}\, CombatSvc\_Support\ +\ \beta_{12} Bachelors\ +\ \beta_{13} Masters\ +\ \beta_{14} Married\ +\ \beta_{15} YOS\ +\ \beta_{16}\, Expected\_Civ\_Pay$$

A second equation was estimated using the same variables as the base model that included variables that controlled for an individual's discount rate and quality score. A separate model was estimated with these variables because only 82 observations from the previous model provided information necessary to compute a personal discount rate and quality score.

The equations were estimated using probit regression to analyze the marginal probability associated with each explanatory variable. In this model, the marginal probability was the change in the probability of participating in a voluntary separation program associated with a one-unit change in a specific independent variable; *ceteris paribus* .A probit regression was used because the dependent variable is binary and it solved the problem of heteroskedasticity by using the maximum likelihood estimation (Wooldridge, 2008). Stata an econometric software package was used to perform the regression.

C. HYPOTHESIZED RELATIONSHIPS

1. Dependent Variable

The dependent variable VSIP_Part was constructed from an assessment instruments in the survey. Respondents were asked if a voluntary separation incentive were offered, how likely they would take advantage of such a program. Responses were

limited to: (a) very likely, (b) likely, (c) not sure, (d) unlikely and (e) very unlikely. VSIP_Part was coded 1, if the respondent replied very likely and likely, and coded 0 if he/she said not sure, unlikely and very unlikely to participating in a voluntary separation incentive program.

2. Independent Variables

Several factors should effect an individual's decision to participate in a voluntary separation incentive program. The following describes the variables used in the study and their hypothesized effect on an individual's likelihood to participate in voluntary separation program.

(1) Gender: To control for gender specific differences in voluntary separation participation behavior a dummy variable was constructed for gender. These differences may not be observable because of the small number of female observations in the sample. However, it is expected that female officers would be less likely to participate in a separation program because of lower civilian earnings. Survey participants were asked to self-identify as either male or female.

(2) Race/Ethnicity: In an effort to control for racial and ethnic differences in an individual's participation behavior a race-ethnic variable was included in the model. The survey asked participants to identify the racial category to which they belong from the following choices: white, black/African American, Spanish/Hispanic descent, Native American/Eskimo, Asian and other. For analytic purposes, the last five categories were collapsed into a minority category and then converted to a dummy variable. The category white is excluded from the model. It is expected that minorities will potentially have lower civilian earnings, and minority officers will be more likely to stay on active duty. It is expected that minority officers will be less likely to participate in a voluntary separation program.

(3) Number of Dependents: Prior research postulates that as the number of dependents in a service member's family increases, the more likely he/she will be to remain on active duty. Therefore, the number of dependents is expected to lower the probability of an officer participating in a voluntary separation program.

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(4) Marital Status: Compared to single service-members, married service-members tend to remain on active duty rather than separate. Medical health plans, BAH allowances and other non-pecuniary benefits offered by the military increase a married service members' opportunity cost of separating. An officer's marital status is expected to have a negative influence on his or her decision to participate in a voluntary separation program.

(5) Pay Grade and years of service: As an officer's rank and years of service increase, it was expected that he or she would be less likely to participate in a voluntary separation program. Officers in higher pay grades and with more years of service have a vested interest in the military's retirement system. They would be more inclined to complete 20 or more years of service to collect retirement pay and other non-pecuniary retirement benefits.

(6) Education: The impact of increased education, such as master's and doctorate degree, on an officer's decision to participate in a voluntary separation program is unclear. One hypothesis is that officers with education levels higher than a bachelor's degree could believe they are not being properly compensated for their higher education level in the Marine Corps and may expect to find a higher paying job in the civilian market. In this case, officers will be more likely to participate in voluntary separation program as education increases. The counter to the aforementioned hypothesis is that officers could view having a graduate education as increasing his or her probability of promotion and value to the Marine Corps. In this case, officers would be less likely to participate in a voluntary separation program as education increases. The Marine Corps would hope that the latter case is prevalent if a voluntary separation program was implemented.

The survey asked participants to identify the highest educational degree attained from the following responses: associates degree, bachelors' degree, masters' degree and doctoral degree. There were no respondents with less than a bachelor's degree. For analyses, the categories were transformed into dummy variables with doctorate as the excluded category.

(7) Military occupational specialty: It is expected that military occupational specialty will have both a negative and positive influence on an officer's decision to participate in a voluntary separation program. For instance, aviators are expected to have a lower probability of participating in a voluntary separation program. On average, Marine aviators receive more pay compared to officers in other military occupational specialties. In addition to basic pay and allowances, these officers receive special annual bonuses; as high as $25,000, to remain on active duty. Conversely, it expected that officers serving in combat and service support communities would have a higher probability of participating in a voluntary separation program.

The survey asked participants to identify their primary military occupational specialty. For analysis, each response was categorized as aviation, aviation support, combat arms and combat service support. Dummy variables were generated for each category with combat arms military occupational specialty as the excluded category.

(8) Expected civilian pay. If an officer's expected civilian earnings is greater that his or her current military pay, the officer will be more likely to separate; it was anticipated that expected civilian labor earning will have a positive influence on an officer's decision to participate in a separation program. If expected, civilian earnings are less than current military pay, the probability of participation decreases. To get the data for expected civilian pay, the survey asked participants to identity the annual income they would expect in the civilian labor market.

(9) Discount rate. It is expected that an officer's discount rate will have a positive effect on the probability of an officer participating in a voluntary separation program.

D. RESULTS OF MULTIVARIATE MODELS

This section discusses and interprets the results of the empirical analysis. Subsections 1 and 2 present and discuss the findings on the effect of personal, professional and economic characteristics on the voluntary separation behavior of Marine officers. To estimate these effects, multivariate probit models are estimated to determine the direction and the magnitude of the variables discussed in Chapter IV.

Subsection 3 presents and discusses the results of ordinary least squares models (OLS) used to estimate the effects of personal, professional and economic factors on the amount of lump sum payment an officer would accept for voluntary separation. A second OLS model is estimated to determine the effects of similar factors on an officer quality score rating.

1. Voluntary Separation Estimation Results

Table 14 displays the estimation results for the likelihood of an officer participating in a voluntary separation program:

Table 14.   Voluntary Separation Estimation Results

Variable		Parameter Estimate		Standard Error		Pr>|Z|		Partial Effects
Female		-0.5797		0.1426		0.2030		-0.2087
Minority		0.1250		0.0970		0.6090		0.0494
num_deps		-0.5767		0.1833		0.2150		-0.2270
O1		0.2954		0.2399		0.6260		0.1174
O2		0.2163		0.1539		0.5760		0.0858
O2E		-0.0185		0.2311		0.9750		-0.0073
O3		0.7262		0.1261		0.0310[1]		0.2835
O3E		0.2731		0.1357		0.4250		0.1084
Aviators		0.0148		0.1118		0.9580		0.0058
Aviation_Support		0.1686		0.1794		0.7080		0.0669
CombatSvc_Support		0.4543		0.0969		0.0690[2]		0.1784
Bachelors		-0.9840		0.2534		0.1830[3]		-0.3757
Masters		-0.7209		0.2428		0.3330		-0.2635
Married		-0.1680		0.1547		0.6750		0.0656
YOS		-0.0404		0.0276		0.5650		-0.0159
Expected_Civ_Pay		0.0413		0.0093		0.0820[2]		0.0163
R-Squared		0.0809						
Observations		190						

1 Coefficient is significant at the 0.05 level.
2 Coefficient is significant at the 0.10 level.
2 Coefficient is significant at the 0.10 level of a 1 tail test.

The probit model accounted for approximately 8% of the variation in the dependent variable. The partial effect coefficients explained the likelihood of participation would change based on a one unit change in the independent variables. Most of the partial effect coefficients were as expected although not significantly different from zero at the 1% level. The partial effects results indicate that the probability of a female officer participating in a voluntary separation program was lower compared to their male counterparts. Females were .2087 less likely to participate in a voluntary separation program. The coefficient of female was statistically insignificant. Although insignificant, these results were expected.

Female officers are less likely to participate because their wages in the civilian labor market are likely to be lower than male officers (Ehrenberg & Smith, 2003). Therefore, if they chose to participate and leave the military they could expect to earn less in the civilian labor market than their male counterparts.

Being a minority had an insignificant positive effect on a Marine officer's probability of participating in voluntary separation program. Minority officers were 0.0494 more likely to participate in voluntary separation program than white officers. This finding was unexpected. It was thought that since civilian earnings are greater for whites than minorities, there would be a lower propensity for minorities to participate in a voluntary separation program. These results contradict existing evidence that minorities are on average, less likely to voluntary separate (Mehay & Hogan, 1995).

The partial effects revealed that the number of dependents had a negative effect on the probability of an officer participating in a voluntary separation program. Officers who added one more dependent were 0.2271 less likely to participate in a voluntary separation program. While the effect of one more dependent was negative, the coefficient was not statistically significant. The effect, although insignificant, was anticipated. The decreased participation associated with having another dependent may be explained through the increased need for benefits offered by the military.

A Marine's pay grade had differing effect on the probability of an officer participating in a voluntary separation program. Officers in pay grades O-1, O-2, O-3 and

O-3E had a positive effect on participation. Compared to field grades, officers in lower pay grades were 0.1174, 0.0857, 0.2834 and 0.1083 more likely to participate in a voluntary separation program, respectively. The effect of officers in pay grade O-2E was negative. Compared to field grades, officers in pay grade O-2E officers were 0.0072 less likely to participate in a voluntary separation program, the reason is unclear. The coefficient of O-2E was also significant at the 0.05 level. With the exception of O-2E, these results are consistent with existing evidence that service members in higher pay grades are less likely to voluntarily separate (Mehay & Hogan, 1995). It was expected that field grade officers would be less likely to participate. Field grade officers are closer to or at retirement and would, therefore, waive retirement pay if they choose to participate in a voluntary separation program.

The effects of having an aviation, aviation support, and combat service support military occupational specialty were anticipated. Compared to officers in the combat arms military occupational specialty, officers in aviation, aviation support, and combat service support military occupational specialties were more likely to participate in voluntary separation program. The partial effects were 0.0058, 0.0669, and 0.1784, respectively. While the coefficient of combat service support military occupational specialty was significant, the results suggested that noncombat arms military occupational specialty were more likely to participate in a voluntary separation program. The results were expected for officers in aviation support and combat support military occupational specialties, since these officers have obtained training and education in jobs that are transferable to the civilian labor market. The result for aviation was not anticipated. It was expected that officers in aviation military occupational specialty would be less likely to participate because of the incentive pay they receive for remaining on active duty.

The hypothesized effects of having a bachelor's or master's degree were unclear. The partial effects revealed that compared to the base group, doctorate degree, the effects of having a bachelor's and master's degree were negative, 0.3756 and 0.2634 respectively. While only the coefficient of bachelors was significant at the 10% level of a one tail test, the results reveal that officers with less than a doctorate degree are less

likely to participate in a voluntary separation program. These results suggest that officers with doctorate degrees may feel more confident about long term job opportunities in the civilian labor market. Or, officers with doctorate degrees may feel that they are not being compensated for their higher education levels and may expect to find a higher paying job in the civilian labor market.

Marital status and had an insignificant negative effect on a Marine officer's probability of participating in a voluntary separations program. The partial effects of marital status show that married officers were 0.065 less likely to participate in voluntary separation program. These results were expected, and may be explained by the fact that military allowances and benefits are greater for those with dependents.

Years of service had a negative effect on the probability of an officer who chose to participate in a voluntary separation program. Although insignificant, the effect of one more year of service was negative 0.0159. This result was expected. As an officer's time in service increases, he or she grows closer to being retirement eligible. This fact then should make it less advantageous for officers with more years of service to participate in a voluntary separation program. Doing so would entail forfeiting retirement pay and non-pecuniary benefits.

As anticipated, the effect of a one unit increase in expected civilian earnings on the probability of participating in a voluntary separation program was significant and positive. The partial effect indicates that as expected civilian pay increases, the probability of participation in a voluntary separation program was 0.0162.

2. Voluntary Separation Estimation (Personal Discount Rate)

This section presents the results of the probit model that included personal discount rate and quality score as independent variables. Table 15 displays the estimation results.

Table 15.   Voluntary Separation Estimation Results (With Discount Rate)

Variable		Parameter Estimates		Standard Error		Pr>|Z|		Partial Effects
Expected_Civ_Pay		0.0370		0.0118		0.4580		0.0088
Discount_rate		0.0636		0.0051		0.0031[1]		0.0151
Quality_score		0.2959		0.0854		0.4110		0.0702
Married		-0.6257		0.1439		0.1872[2]		-0.1719
Minority		0.1256		0.1275		0.8020		0.031
O2		0.5828		0.2558		0.4940		0.1577
O3		0.5828		0.1664		0.3810		0.1432
Bachelors		-0.5598		0.2042		0.3910		-0.1561
Aviation		0.8230		0.1757		0.1332[2]		0.2345
Aviation_Support		0.6201		0.291		0.4490		0.1868
Combat_Arms		-0.2025		0.1264		0.7250		-0.0462
YOS		-0.1093		0.0375		0.4940		-0.0259
Pseudo R2		0.2034						
Observations		82						

1 Coefficient is significant at the 0.05 level.
2 Coefficient is significant at 0.10 level of a one tail test.

The model accounted for approximately 20.4% of the variation in the dependent variable. The partial effect coefficients explained the likelihood of participation that would change based on a one unit change in the independent variables. The partial effects of minority, pay grade, education, MOS, expected civilian pay and YOS variables all had similar effects on the probability of participation as the model above. The partial effects of marital status changed in this model. Marital status had a significant effect, at 0.10 level of a one tail test, on a Marine officer's probability of participating in voluntary separation program. The partial effect of marital status shows that married officers were 0.1719 less likely to participate in a voluntary separation program. Unlike the previous model, which revealed married to have a positive effect on participation, these results were anticipated.

The effects of personal discount rate (PDR) determined by this study revealed that a one percent increase in the PDR increases the probability of an officer participating in a

voluntary separation program by 1.5%. The partial effect of PDR was 0.0151 and proved to be significant at the 0.05 level, holding all else constant. This implies that officers who place more value in current dollars (lump sum) over future dollars (retirement pay) have higher discount rates and are, therefore, more likely to participate in a voluntary separation program.

Quality score had a positive effect on the probability of an officer choosing to participate in a voluntary separation program. Although insignificant, the effect of a one unit increase in quality score was 0.0702. This result suggests that higher quality officers were more likely to participate in a voluntary separation program.

3.   Ordinary Least Squares Estimation Results

a.   *Quality Score Estimations*

This section presents the results of the ordinary least squares model that estimated the effects of personal and professional characteristics on the computed quality score of officers in the sample. Table 16 displays the estimation results.

Table 16.   Quality Score Estimation Results

Variable		Parameter Estimates		Standard Error		P-Value
Aviation		-0.4992		0.1746		0.0060[1]
Aviation_Support		-0.0983		0.2847		0.7310
CombatSvc_Support		-0.2857		0.1540		0.0680[2]
Minority		0.2514		0.1593		0.1190[3]
O2		-0.9690		0.1971		0.0000[1]
O3		-0.5385		0.1911		0.0060[1]
Bachelors		-0.0886		0.1854		0.6340
YOS		0.0163		0.0515		0.7530
discountrate		-0.0110		0.0069		0.1130[3]
R-Square		0.4988				
Observations		82				

1 Coefficient is significant at the 0.01 level.
2 Coefficient is significant at the 0.10 level.
3 Coefficient is significant at the 0.10 level of a one tail test.

The model accounted for approximately 49 percent of the variation in the dependent variable. Each estimated coefficient explained how much an officer's quality score would change based on a one unit change in the independent variable. The parameter estimates of the MOS variables were generally expected. Compared to the base category, combat arms MOS, officers in noncombat MOS had lower quality scores. However, the coefficient of aviation support MOS was statistically insignificant.

Minority variable was significant and had a positive impact on quality score. The coefficient of the minority variable was 0.2514. This coefficient can be interpreted as being a minority officer will increase quality score by 0.2514 points, holding all other variables constant. The positive coefficient for minorities suggests that minority officers in the sample had higher quality scores compared to white officers.

The parameter estimates of pay grade were significant and had a negative effect on quality scores. These effects were anticipated. Compared to the base group, field grade officers, both O-2 and O-3 pay grades were negative, 0.9690 and 0.5385, respectively. The results reveal that holding all else constant officers in pay grades O-2 and O-3 will decrease quality score by 0.9690 and .05385 points respectively. Furthermore, the results indicate that field grade officers in the sample had higher quality scores.

The coefficient of the education variable was negative and insignificant. The parameter estimate of education variable was negative 0.0886. This result shows that having a bachelor's degree decreased quality score by 0.0886 points, holding all other factors constant. This infers that officers with an education level greater than a bachelor's degree had higher quality scores.

b. *Personal Discount Rate Estimations*

The results of the ordinary least squares model that estimated the effects on personal discount rate are presented in Table 17.

Table 17.   Personal Discount Rate Estimation Results

Variable		Parameter Estimates		Standard Error		P-Value
Aviation		-5.0278		2.6919		0.0660[2]
Aviation_Support		-4.9676		4.7324		0.2970
CombatSvc_Support		-3.3469		2.4408		0.1740[3]
YOS		-1.2821		1.2164		0.2950
Married		2.1572		2.4740		0.3860
qualityscore		-3.9188		1.6803		0.0220[1]
R-Squared		0.1401				
Observations		82				

1 Coefficient is significant at the 0.01 level.
2 Coefficient is significant at the 0.10 level.
3 Coefficient is significant at the 0.10 level of a one tail test.

The model accounted for approximately 14 percent of the variation in the dependent variable. Each estimated coefficient explained how much an officer's personal discount rate would change based on a one unit change in the independent variable. The parameter estimates of the military occupational specialty variables were generally expected. Compared to the base category, combat arms military occupational specialty, officers in non combat military occupational specialty had lower discount rates. The coefficients of aviation and combat service support military occupational specialty were significant. The results suggest that officers in combat arms military occupational specialty are less patient. They would rather receive an immediate pay off even thought the amount received is less compared to a future pay off.

The coefficient of quality score was negative and significant. The results indicate that as quality score increases personal discount rate decreases by 3.9 percent. Officers with higher quality scores are more patient and would rather wait to receive a future pay off rather than receive an immediate pay off. This implies that higher quality officers place more value in future dollars.

Years of service had negative but insignificant effect on personal discount rates. The coefficient can be interpreted as an additional increase in years of service

decreases personal discount rate by 1.2 percent. Officers with more years of service have lower discount rates. If years of service is used as an indicator of age, the more years of service the older the individual, then the results were consistent with economic theory which suggested that younger individuals discount income at a higher rate than older individuals (Mankiw, 2004).

E.   CHAPTER SUMMARY

Findings of the probit models used in the study indicate that expected civilian pay, personal discount rate, marital status, certain Marine occupational specialties (MOS) and officers in the O-3 pay grade had a significant effect on the probability of a Marine officer participating in a voluntary separation program. Some of the results are consistent with the findings reported by Mehay and Hogan (1995) who analyzed the factors affecting the voluntary separation behavior of Navy enlisted personnel in FY92. The ordinary least squares model used to estimate the effects on an officer's quality score rating indicated that MOS, race and pay grade had significant effects. The results of the personal discount rate ordinary least squares model indicated that quality score, and aviation and combat service support military occupational specialties had a negative and significant effects.

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VIII. SUMMARY AND CONCLUSIONS

A.   SUMMARY

The objective of the study was to determine the feasibility of the Marine Corps using a uniform price quality adjusted auction to assign voluntary separation bonuses and retain higher quality officers. The second objective was to identify the effects of personal, professional, and economic factors on a Marine officer's decision to participate in a voluntary separation program. To collect the necessary data needed to address these objectives, a survey was designed and administered to approximately five hundred unrestricted Marine officers assigned to I Marine Corps Expeditionary Force, Naval Postgraduate School, and Defense Language Institute. The survey provided data used to: (a) compute a quality score rating for use in quality adjusted discount auction simulations, (b) determine an officer's reservation value for separating from the military reflected by the minimum amount of lump sum pay he or she would accept for voluntary separation, and (c) gather data to conduct empirical analysis.

The methodology used to conduct quality adjusted discount simulations closely followed that used by White (2010), but focused on a separation application, rather than retention. Unlike White's (2010) study, which used randomly generated data, the survey results provided actual data to conduct all simulations. Multivariate probity and ordinary least squares models were estimated to derive the effect of personal, professional, and economic traits on the decision to participate in a voluntary separation program. The probability of participating in a voluntary separation program was estimated to be a function of the following traits: gender, race, military occupational specialty, pay grade, marital status, level of education, years of service, expected civilian earnings, personal discount rate, and number of dependents.

The results obtained from the survey analysis, auction simulations, and multivariate regressions could provide Marine Corps manpower planners with qualitative and quantitative information. The information could be used to assist with decisions regarding the expected downsizing of the Marine Corps' force structure.

B. CONCLUSIONS

The study explored prior auction research that evaluated the efficiency and cost savings that may be achieved by using a quality adjusted auction for assigning voluntary separation pay. Results from the voluntary separation survey, auction simulations, and multivariate models addressed the primary and secondary research questions.

The results indicated that there was a weak but positive correlation between a quality officer and his or her reservation value for separating from active duty. The finding supports prior quality adjusted discount auction research. Results from the auction simulations indicated that the uniform price quality adjusted discount auction has the potential to improve the average quality of officers retained in the military and reduce total separation cost (Table 10). Cost savings does not necessarily increase or decrease as we vary the assistance ($A) or quality threshold (q*). However, the QUAD auction is superior to a standard auction format in terms of both cost and quality control. The QUAD auction is very useful because it provides manpower planners the flexibility to set appropriate separation bonus amounts, number of separations, as well as average quality of officers retained. Quality gains and cost savings depend on the target separation goal, the predetermined quality rating, and the quality adjusted discount allowance. Unlike, a retention auction where higher quality officers receive higher retention bonuses, higher quality officers receive lower separation bonuses than lower quality officers in a quality adjusted auction for separation.

The multivariate probit models found that expected civilian pay, personal discount rate, officers in the O-3 pay grade and officers in combat service support MOS had a positive and significant effect on participation in a voluntary separation program. This is an important finding because it supports the idea that individuals with higher reservation value, higher outside options and higher quality are presumably more likely to leave the military. Additionally, the study suggests that officers in combat arms MOS are more likely to remain on active duty. Marital status and Marines with a bachelor's degree had a negative and significant effect on the probability of a Marine officer participating in a voluntary separation program. Again, it may be in the Marine Corps

best interest to retain highly qualified officers with higher levels of education. However, the study suggests that officers with more than a graduate education are more likely to leave the military. Ordinary least squares estimates found that that military occupational specialty, pay grade and personal discount rate had a negative and significant effect on an officer's quality score rating. Race, and pay grade had a positive and significant effect on an officer quality score rating. Results of the ordinary least squares estimates on discount rate found that officers in aviation and combat service support military occupational specialties, and quality score had a negative and significant effect.

Several findings were produced based on analysis of information collected in the voluntary separation survey. More than one-half of the survey participants reported they would not participate in a voluntary separation program offered by the Marine Corps. Participants indicated retirement benefits as the primary reason for choosing not to participate in a voluntary separation program. The average requested lump sum payment requested for voluntary separation was $284,000 compared to the previous $67,000 given under the special separation benefit program. Officers with 10 to 16 years of service requested significantly higher lump sum payments compared to those with less than 9 years of service and more than 17 years of service, which is rational since officers with more years of service are closer to retirement. It was assumed the officers had higher reservation values to compensate for the loss of retirement pay they would waive by separating early from the military. The results indicated that 53.7 % of captains with 8 years of service requested a lump sum payment of $100,000 or less. This amount is commensurate with the amount offered by the Air Force's 2010 voluntary separation policy to officers in stated time in grade and explains the difference between the average of $284,000 lump sum request. The results showed that officers with 8 or less years of service had higher discount rates compared to those with 9 or more years of service. The result indicated that younger officers used a higher personal discount rate in their participation decision. Officers with 8 years of service had a preference for current dollars and were more likely to accept a lump sum payment for voluntary separation.

Based on the results of the study, there was evidence to assist Marine manpower planners in predicting the appropriate incentive to induce voluntary separation. The study

provided actual data on a Marine's reservation value for separating from the military, their discount rate, and the influence of personal traits on voluntary separation behavior. Having the ability to determine the approximate separation bonus that would be required to encourage Marines to voluntary separate from the military could aid manpower planners in developing appropriate and effective force-shaping policies.

C.   RECOMMENDATIONS

The auction model presented in the study needs more experimental testing before it can be implemented. The auction assumed that participants in the survey identified their true reservation value for voluntary separation. This assumption can be erased in a controlled environment where participants are given counseling to explain the rules and bidding process in the auction. For the auction to be successful, Marines must participate in the auction, which requires knowing the bidding process and how the auction works.

The study focused on a lump sum monetary incentive that would induce voluntary separation. While monetary rewards may induce voluntary separation, it is not the only reason. It is recommended that further research be conducted to identify whether a combination of monetary and nonpecuniary rewards would encourage more Marines to consider voluntary separation. It is recommended to conduct research to determine if a lump sum, or annuity incentive, were offered, then which incentive program a Marine likely would accept.

The researcher recommends conducting a Marine Corps wide survey similar to the one used in this study. A large scale survey could shed more light on the factors influencing the decision of service members to voluntary separate. For example, survey data examining general reservation values for separation, personal discount rates, commitment levels and quality standards could help determine appropriate and effective downsizing policies.

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APPENDIX.   VOLUNTARY SEPARATION SURVEY

1. Naval Postgraduate School Consent to Participate in Anonymous Survey

You are invited to participate in a research study entitled Voluntary Separation of Marine Corps Officers during a Reduction in Force for the purpose of studying the economics of Marine Corps Officer separation behavior.

Analysis of the survey results will assist Marine Corps Manpower Planners and Policy Analyst in shaping and managing the Marine Corps Officer Force Structure.

This survey contains 54 questions and will take approximately 30 minutes to complete. Three of these questions will ask for information from your Master Brief Sheet (MSB) which is available via Marine Online. If you participate, you are free to skip any questions or stop participating at any time without penalty. Your responses are anonymous. Results of the survey will be used responsibly and protected against release to unauthorized persons; however, there is a minor risk that data collected could be mismanaged. In spite of this minor risk, all precautions will be taken to ensure your results of the survey are used responsibly and are protected against release to unauthorized persons. Additionally, your personal information will not be available to the researchers.

If you have questions regarding the research contact Dr. Noah Myung, 831-656-2811, noah.myung@nps.edu or Capt Quincy Pearson at qrpearso@nps.edu . If you have any questions regarding your rights as a research subject, please contact the Naval Postgraduate School IRB Chair, CAPT John Schmidt, USN, jkschmid@nps.edu , 831-656-3864.

1. I have read the consent to participate form and understand the content of this survey.

◯ Yes

◯ No

2. Demographics

1. Gender?

- ◯ Male
- ◯ Female

2. Are you:

- ◯ White
- ◯ Black/African American
- ◯ Spanish/Hispanic descent
- ◯ Native American/Eskimo
- ◯ Asian
- ◯ Other

3. How many children do you have?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 or more

4. What is your current marital status?

- ◯ Never married
- ◯ Married
- ◯ Divorced
- ◯ Separated

5. What is your current pay grade?

○ O-1

○ O-1E

○ O-2

○ O-2E

○ O-3

○ O-3E

○ O-4

○ O-5

○ O-6

6. Were you promoted to your current grade from?

○ N/A (does not apply)

○ Above Zone

○ In Zone

○ Below Zone

○ N/A (pay grades O-1 to O-3)

7. Since you've been in your current grade, have you been passed over for promotion?

○ No

○ Yes, once

○ Yes, twice or more

○ N/A (Does not apply)

8. If you were passed over for promotion, do you think you were competitive for promotion?

○ Yes

○ No

○ N/A

9. What is your primary military occupational specialty (MOS)?

○ 0180 Adjutant

○ 0203 Ground Intelligence

○ 0204 Human Intelligence

○ 0206 Signals Intelligence

○ 0207 Air Intelligence

○ 0302 Infantry

○ 0402 Logistics

○ 0602 Communications/Data

○ 0802 Artillery

○ 1302 Engineer

○ 1802 Armor

○ 1803 Amphibious Assault Vehicle

○ 3002 Ground Supply

○ 3404 Financial Management

○ 4302 Public Affairs

○ 4402 Judge Advocate

○ 5803 Military Police

○ 6002 Aircraft Maintenance

○ 6602 Aviation Supply

○ 7208 Air Support Control

○ 7210 Air Defense Control

○ 7220 Air Traffic Control

○ 7580 Naval Flight Officer

○ 7599 Naval Aviator

10. Total years of service?

11. Years/months of service in current grade (e.g., 1 year 4 months)?

12. Years/months of service in primary MOS (e.g., 1 year 4 months)?

13. What is your current level of security clearance?

◯ Top Secret

◯ Secret

◯ Confidential

◯ None

14. What is your commissioning source?

◯ United States Naval Academy (USNA)

◯ Marine Enlisted Commissioning Education Program (MECEP)

◯ Enlisted Commissioning Program (ECP)

◯ Meritorious Commissioning Program (MCP)

◯ Naval Reserve Officer Training Corps (NROTC)

◯ Platoon Leaders Course (PLC)

◯ Officer Candidate Course (OCC)

15. What was your TBS ranking?

◯ Top Third of TBS Class

◯ Middle Third of TBS Class

◯ Bottom Third of TBS Class

◯ Do not recall

16. What is your General Classification Test(GCT)score?

◯ 120-125

◯ 126-130

◯ 131-140

◯ 140 and above

◯ Do not recall

3. Education Background

1. Are you PME complete for next pay grade?

○ Yes

○ No

2. What is the highest degree you have earned?

○ Associate's

○ Bachelor's

○ Master's

○ Doctorate

○ Other (please specify)

3. Select the major that best fits your highest degree:

- ◯ Accounting
- ◯ Anthropology
- ◯ Art
- ◯ Biology
- ◯ Business
- ◯ Chemistry
- ◯ Communications
- ◯ Computer Science
- ◯ Criminal Justice
- ◯ Economics
- ◯ Education
- ◯ Engineering
- ◯ English
- ◯ Environmental Studies
- ◯ Foreign Language
- ◯ Geography
- ◯ Health Services
- ◯ History
- ◯ Hospitality, Recreation, and Resort Management
- ◯ Information Technology
- ◯ International Studies
- ◯ Legal Studies
- ◯ Management
- ◯ Marketing
- ◯ Mathematics
- ◯ Music
- ◯ Philosophy
- ◯ Physics
- ◯ Political Science
- ◯ Psychology
- ◯ Public Administration

○ Religious Studies

○ Sociology

○ Social Work

○ Theater

○ Arts and Humanities not covered above

○ Technical Specialty not covered above

○ None of the above

4. From what college was your undergraduate degree granted?

5. From what college was your Master's degree granted?(enter N/A if you do not have a Masters degree)

6. From what college was your Doctorate degree granted? (enter N/A if you do not have a Doctorate degree)

7. Any other graduate degree and University (e.g. Law degree, enter N/A if this question does not apply to you):

4. Voluntary Separation Participation

1. If a voluntary separation incentive were offered, how likely would you be to take advantage of such a program?

( ) Very likely

( ) Likely

( ) Not sure

( ) Unlikely

( ) Very Unlikely

( ) Would not consider voluntary separation (please state why)

[   ]

2. What is the minimum monetary compensation would you require to be voluntary separated from the military (Please enter a dollar amount)?

[   ]

3. If you could receive an annual payment for a period of time that is twice your current years of service (2 x your number of years of service)to voluntary separate from the military, how much would that payment be? e.g., if an O-3 with 7 years of service requests an annual payment of $20,000, then he/she would receive $20,000 for 14 years. (Please enter a dollar amount)

[   ]

4. If you elected to participate in a voluntary separation incentive program, would you require pension benefits?

( ) Yes

( ) No

5. Select the most important benefit that could be made available to you in a voluntary separation program:

( ) Separation pay

( ) Extended Health coverage

( ) Retiree health benefit (for service members not yet eligible to retire)

( ) Other (please specify)

[   ]

5. Post-military Decisions

1. What career field would you pursue after leaving the military?

2. Expected annual salary of post-military position (e.g., $100,000)?

3. After leaving the military would you pursue a civilian position related to your MOS?

○ Yes

○ No

4. In your current rank, how would you rate your total compensation (pay, bonuses, health benefits/insurance and allowances) in the military compared to those you would expect in the civilian world?

○ Much better as a civilian

○ Somewhat better as a civilian

○ No difference

○ Somewhat better in the military

○ Much better in the military

○ Don't know

6. Knowledge, Special Skills and Abilities

1. Are you proficient in a second language(s)? If yes please state.

○ No

○ Yes

[   ]

2. Do you hold a professional civilian certification? If yes please state.

○ No

○ Yes

[   ]

3. During your off-duty time, do you hold a second job or work at your own business? If yes, please state.

○ No

○ Yes

[   ]

7. Military Career

1. In your military career have you held a command position where you held NJP authority?

○ Yes

○ No

2. In your military career have you held any staff positions, i.e., executive officer, operations officer?

○ Yes

○ No

3. In your military career have you completed a 'B' Billet? If yes please state.

○ No

○ Yes

[_____]

4. How many Joint Duty Assignments have you held in your military career?

○ 0

○ 1

○ 2

○ 3 or more

5. In your military career how many personal awards were you awarded?

○ None

○ One

○ Two

○ Three

○ Four

○ Four or more

6. In your military career how many personal awards (with combat distinguishing device) were you awarded?

○ None

○ One

○ Two

○ Three

○ Three or more

8. Performance/Career Characteristics

The following questions ask for information from your Master Brief Sheet

1. Under the Performance Evaluation Summary (Reporting Senior Markings) of your Master Brief Sheet did your Reporting Senior recommend you for promotion on your last 3 observed Fitness Reports?

○ Yes

○ No

2. Did your Reviewing Officer concur with your Reporting Senior's recommendation to promote?

○ Yes

○ No

3. Under the Performance Evalaution Summary (Reporting Senior Markings) what was the "Relative Value at Processing" (RV at Proc) of your last three observed Fitness Reports?

Report 1: [   ]

Report 2: [   ]

Report 3: [   ]

4. How many combat deployments (6 months or more) have you completed?

○ 0

○ 1-2

○ 3-4

○ 5 or more

5. How many combat deployments (6 months or more) have you completed in your present grade?

○ 0

○ 1-2

○ 3-4

○ 5 or more

6. What is your current PFT score?

- ◯ First Class
- ◯ Second Class
- ◯ Third Class
- ◯ Fail
- ◯ Exempt

7. What is your current CFT score?

- ◯ First Class
- ◯ Second Class
- ◯ Third Class
- ◯ Fail
- ◯ Exempt

9. Decision to remain or leave the military

1. How satisfied are you with your military pay and allowances:

○ Completely Dissatisfied

○ Somewhat Dissatisfied

○ Neutral

○ Somewhat Satisfied

○ Completely Satisfied

2. Which of the following best describes the financial condition of you (and your spouse)?

○ Very comfortable and secure

○ Able to make ends meet without much difficulty

○ Occasionally have some difficulty making ends meet

○ Tough to make ends meet but keeping head above water

○ In over your head

3. If you had to decide today, and had no obligation of continued service, would you stay the military?

○ Yes

○ No

4. If yes to question #3, which of the following is the most important reason you would stay in the military? (Select ONE option only)

☐ Educational opportunities

☐ Patriotism

☐ Pay

☐ Pension

☐ Job Security

☐ Health care for me and my family

☐ Career satisfaction

☐ N/A (I answered NO to question #3)

☐ Other (please specify)

5. If no to question #3, which of the following is the most important reason you would leave the military? (Select ONE option only)

☐ Spouse's Job Opportunity

☐ Health care for me and my family

☐ Working conditions

☐ Pay

☐ Better Civilian job opportunity

☐ Frequent Deployments

☐ Family Stability (desire to remain in one place)

☐ N/A (I answered YES to question #3)

☐ Other (please specify)

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